Master thesis for the Master of Philosophy in economics degree

Can Petroleum Fund after the Norwegian Model be the solution to resource curse in oil- rich developing countries?

A neoclassical look at the Angolan post-war economy

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Preface

After a long and devastating civil war that led to disruption of infrastructures, brain-drain and failed economic policies, the Angolan economy is finally experiencing a new dawn. In 2002 a final peace agreement was signed between The Government led by MPLA (Movimento Popular de Libertação de Angola) and the former rebel group UNITA (União Nacional para a Independência Total de Angola).

The peace agreement has brought a new hope for a better future for millions of Angolans still living under the poverty line. In times of peace, new hopes and renewed dreams coincide with increased oil production, record oil prices and increased government revenues. Most of Angolans expect now to have more dividends from oil resources.

I share that dream. Coming from Angola and having been given the opportunity to live, work and study in Norway, an oil rich developed country, I am interested in giving, through this master thesis, my humble contribution to the increasingly hot topic of oil management in developing country.

I am highly thankful to all my family, friends and fellow students who direct or indirectly have supported me through this long journey in search for knowledge. Special thanks to all the professors and lecturers at the Department of Economics for their humbleness, contrasting with their great academic achievements. I am also grateful to the administration staff at the Department of Economics for their services.

Finally I am congratulated for the support and orientation from my supervisor, Espen Henriksen, especially for having assisted me in my struggle with the programming language software MATLAB. I am the only person to blame for all the eventual mistakes. “Mea culpa!”

I dedicate this thesis to my sister Julieta. May God have her soul!

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Abstract

Authorities in oil rich developing countries are often advised to save part of their oil tax revenues in natural resource funds. One rational for such funds is to reduce the volatility in government spending due to the stochastic nature of oil production and oil prices. A second rational for such fund is equal distribution of oil benefits across generations. Norway is often referred to as a good example in management of oil revenues. The country follows a policy rule that guides the spending from the Petroleum Fund established over 10 years ago. Only the expected returns are annually consumed. With a look at the Angolan post-war economy, this thesis questions whether there is a neoclassical rational for a poor country to imitate the Norwegian model.

While one might be apologetic for such imitation simply on general political and institutional grounds, there seems to be difficult to find a clear rational from a pure neoclassical economic point of view that supports such recommendations. As it will be shown, the main reason is that most poor countries are not along a balanced growth path. A model similar to the Norwegian Oil Fund and the related decision rule “Handlingsregelen” will have different intergenerational implications if applied in economies outside the balanced growth path.

1. Introduction, background and objectives

1.1 The intergenerational equity

The question of efficient use of exhaustible resources was for three decades ago brought to the centre of economics by Solow and Hartwick[1]. One concern has been that exhaustible resources should be managed taking into account the needs of future generations. As a general rule of thumb, Hartwick suggested that rents from exhaustible resources should be invested in reproducible capital such as machines. That would solve "the ethical problem of current generation shortcoming future generation by over-consuming". By following Hartwick rule, policy makers in resource-rich countries should keep "the obligation to maintain capital intact" yielding services for infinite number of generations, and thus achieving intergenerational equity. Intergenerational equity was defined by Solow as consumption per capita remaining constant over time, which corresponds to equal consumption across generations along the balanced growth path, when we abstract from technological progress. However, when the economy can not be described to be in the de-trended growth path, steady state, different scenarios may emerge and intergenerational equity may have different implications concerning the use of natural resources.

Achieving inter-generational equity has been the primary goal of the Norwegian Petroleum Fund. The Fund was established in 1990, but only became operational in 1995. As discussed in Humphreys, Macartan and Sandbu, Martin E. (...), the Fund can be characterized by three main features. First, concerning the inflows, all government petroleum revenues are saved. Second, there is a quantitative restriction on withdrawals from the fund. On average only the equivalent of expected returns can be yearly redrawn. Outflows should not exceed 4 percent of the balance of the fund per annum. And the third feature is the qualitative restriction. Outflows are used to finance the balance of government budget.

The Norwegian Petroleum Fund is widely seen as a good example of management of petroleum revenues and resource rich developing countries are often advised to develop

[1] Intergenerational Equity and the Investing of Rents from Exhaustible Resources, John M. Hartwick, American Economic Review, 1977.

similar arrangements as a way of avoiding resource curse, that is, the tendency of failing resource rich countries, as explained in the next section.

1.2 The resource curse

The general tendency of failing resource-rich economies is known as resource curse and it can be explained in 3 different ways. As discussed in Oomes, Nienke and Kalcheva, Katerina (2007), one possible explanation is the Dutch disease which can be defined as the decline of the manufacture and services output, either as result of labour and capital moving to oil sector or as result of high income from oil, and high demand and wages in service sector, forcing manufacture to downsize due to real appreciation. The focus of this thesis will however be on the second and the third explanation, with special emphasis on the third.

The second possible explanation is rent-seeking, that is, attempts to capture existing wealth rather than creating new wealth. Rent-seeking is related to bad institutions, corruption and conflict.

The third explanation is the volatility in consumption and public spending. Large share of government expenditure are exposed to fluctuations, due to fluctuations in oil prices and oil output. Resource rich countries tend to fail when there is a negative shock on their main export commodity and when the resources dry out.

Can a Petroleum Fund after the Norwegian model be a solution to resource curse in oil –rich developing countries? The thesis intends to answer this question looking at the case of Angola, an oil rich southwest African nation. After 27 –year’s civil war that ended in 2002, Angola is now experiencing rapid growth in both oil and non-oil sector.

1.3 Angola

The Angolan GDP has more than doubled since 2002. The total output per capita in 2008 is projected to be more than 5,700 US dollars. Oil production accounts for almost half of the GDP and about 75 per cent of government revenues.

From just under 800 000 barrels per day in 2000, Angola has experienced a sharp increase in its oil output. This year (2008) the country is expected to reach an output of 2 million barrels a day, very close to the projected production peak of almost 2, 2 million barrels per day in 2010/11, from which the production is expected to gradually decline until the complete exhaustion in 2031. This production profile is based on estimates of proven reserves of 9.7 billions of barrels done by the International Monetary Fund and Angolan authorities in 2007. Both possible but not proven oil reserves and gas production are not included.

In a time of expanded output, high oil prices and increased political stability, the government's oil revenues have increased. The Angolan authorities have in the last 5 years faced increased international pressure for more transparent and prudent management of oil revenues. At the same time national pressure for expanded and improved public services has been increasing. Rebuilding basic social infrastructure, accumulating human and physical capital are widely seen by politicians, civil society and international organizations as priorities of the Angolan authorities in order to revitalize the non-oil economy.

In spite of relatively high growth rates, Angolan GDP level is not yet high enough to meet the expectations of most of citizens. The majority of Angolans claim that they have not yet seen "dividends of peace", in a time when studies suggest that current spending level is not sustainable in the long run.

1.4 The core questions

What would happen to long run government spending and the consumption profile if the country creates a fund modelled after the Norwegian Petroleum fund?

How would the spending rule ("handlingsregelen") look like if applied in an economy outside the balance growth path, which is the case of the Angolan economy?

Should the Angolan government spend more or less of its oil revenues, given the country's institutional constraints?

1.5 The approach

We start with a general neoclassical stochastic optimization framework from which we, firstly, derive the decision rules for spending oil revenues, for consumption and for physical capital. The stochastic optimization will give us a general underlying principle that can be applied for a model economy along a balanced growth path (steady state) and for model economy outside the balanced growth path. Secondly, we focus on a particular implementation of the general principle and derive a decision for spending the oil revenues. This new decision rule will convey the essence of the Norwegian rule. Thirdly, we apply the same rule to the model economy outside the balanced growth path. We generalize the results from the decision outside the balanced growth path in order to derive implications for the Angolan economy.

The stochastic optimization problem will be solved by using method of value function iteration. We use the programming language software Matlab in order to derive the approximated solution of the model.

Most of our conclusion will be sustained by the neoclassical point of view. However we reserve a smaller share of this thesis to have a quick look beyond the neoclassical framework. Because we will derive policy implication and recommendations regarding oil management in a developing economy, it is important to bear in mind the impact of quality of the institutions.

2. The neoclassical rational

2.1 The Problem

We consider a benevolent central planer that seeks to maximize the welfare of a large number of identical agents, represented by a single individual. The representative agent derives utility over consumption C_t of both privately produced good and publicly provided private goods financed with oil revenues. Both goods are perfect substitutes. The private good is produced with help of single input k_t, capital. The technology is Cobb Douglas. The standard neoclassical properties of constant return to scale, diminishing marginal productivity of capital are satisfied with the Cobb Douglas production function.

The representative agent lives infinitely. She therefore cares about not only her consumption today, but also her consumption in all subsequent periods. This model simplification incorporates the idea that agents care about the welfare of their descendents. More generally, the model simplifies the idea that current generations care about the standard of living of all future generations.

The utility of the representative agent is described by the utility function with a constant inter-temporal elasticity of substitution, $u(C_t) = \frac{C_t^{1-\sigma}}{1-\sigma}$. The inter-temporal elasticity of substitution parameter σ tells how willing the agent is to shift consumption between two different periods. This type of utility function is also called constant risk aversion utility. The marginal utility is always positive regardless the value of σ .

The central planer problem consists on finding the optimal path of consumption of private good and the optimal amount of oil resources that maximizes the lifetime utility of the representative agent. The choice of consumption of private good determines the amount capital left for next period production, while the choice of oil consumption affects the amount of oil wealth available for next period provision of public goods. The problem can therefore be formulated in the following manner:

$$\underset{\{a_{t+1},k_{t+1}\}_{t=0}^{t=\infty}}{Max} \sum_{t=0}^{\infty} \beta^t u(C_t) \qquad (1)$$

Subject to

$$u(C_t) = \frac{C_t^{1-\sigma}}{1-\sigma} \quad \text{, where } C_t = c_t + g_t \qquad \forall t \qquad (2)$$

g_t is the amount of consumption derived from oil resources.

Although we have a closed economy, the agent can invest the oil wealth in the international marked. The return on the oil wealth is stochastic but follows a normal distribution with the expected value equal to 1,04. On the average fund grows 4 percent each period.

$$a_{t+1} = (a_t - g_t)r_t \Rightarrow g_t = a_t - \frac{a_{t+1}}{r_t} \qquad \forall t \qquad (3)$$

$$r_t = r^* + \varepsilon_t \qquad \varepsilon_t \sim N(0, \sigma^2) \qquad \forall t$$

$$f(k_t) = k_t^{\alpha} \qquad \alpha \in (0,1) \quad \forall t \qquad (4)$$

The law of motion of capital accumulation is,

$$k_{t+1} = (1-\delta)k_t + x_t \qquad \delta \in (0,1), \forall t \qquad (5)$$

where x_t is the investment in new capital and δ is the depreciation rate of old capital

Both consumption and capital stock are strictly positive.

$$k_t, c_t \geq 0 \qquad \forall t \qquad (6)$$

Combining (2), (3), (4), (5) and (6), we obtain the resource constraint.

$$C_t = k_t^{\alpha} + (1-\delta)k_t - k_{t+1} + a_t - \frac{a_{t+1}}{r_t} \tag{7}$$

The initial amounts capital and oil are given.

2.2 The recursive formulation

The problem described in (1), (2), (3), (4), (5), (6) and (7) is infinite horizon dynamic optimization problem. The problem can be transformed into a recursive structure, by using the Bellman equation.

$$V(a,k,r) = \underset{a',k'}{Max}\left[u(k,k',a,a',r) - \beta EV(a',k',r')\right] \tag{8}$$

Subject to the resource constraint

$$c = k^{\alpha} + (1-\delta)k - k' + a - \frac{a}{r}, \tag{9}$$

where, a and k are endogenous state, r is exogenous state variable and a' and k' are control variables. β is the time discount factor. E is the mathematical expectation operator. Both private good and public good are now contained in c

For given amount of capital, oil asset and the exogenous rate r, the representative agent chooses the amount of capital and asset next period that maximizes his life time utility. The value of the maximized lifetime utility is given by the value function V (.).

Because the problem has a recursive structure we have dropped notation of time and have introduced the prime notation to denote the next period values, while the current period variables are simply denoted by the Latin letters.

The solution of the recursive problem has to satisfy the Euler equation.

Taking the first condition with respect to a', we get,

$$\frac{\partial u}{\partial c} = \frac{\beta \partial V(a',k',r')}{\partial a'} \tag{10}$$

Taking the envelope condition the envelop condition, we get,

$$\frac{\partial V(a,k,r)}{\partial a} = \frac{\partial u}{\partial c} r \tag{11}$$

Leading the envelop condition one period ahead, $\frac{\partial V(a',k',r')}{\partial a'} = \frac{\partial u'}{\partial c} r'$, we can derive the Euler equation with respect to the amount the oil wealth.

$$\frac{\partial u}{\partial c}\frac{1}{r} = \beta \frac{\partial u'}{\partial c'} \Rightarrow \frac{\frac{\partial u}{\partial c}}{\frac{\partial u'}{\partial c'}} = \beta r \tag{12}$$

By using the same procedures as in (9), (10) and (11), we can derive the Euler equation with respect to capital.

$$\frac{\partial u}{\partial c} = \frac{\partial u'}{\partial c'} \beta\left[\alpha k'^{\alpha-1} + (1-\delta)\right] \Rightarrow \frac{\frac{\partial u}{\partial c}}{\frac{\partial u'}{\partial c'}} = \beta\left[\alpha k'^{\alpha-1} + (1-\delta)\right] \tag{13}$$

The optimal allocation of oil wealth across generations should be consistent with equation 12. The marginal utility of consumption in current period should be equal to the time discounted present value of marginal utility of consumption. Oil wealth should be allocated such that it is equally valued across time.

Equation (13) states the same principle, in respect to allocation of physical capital.

From the first order conditions we can see that the optimal choice of capital and oil asset for next period will depend on the amount of capital, the amount of oil wealth and the exogenous rate of return on asset in the international market.

Because we do not have the explicit form of the value function V (.) which is in both sides of the equation (8), we approximate it by means of value function iteration. Our goal is to derive numeric solutions for the functional equation (8). The numeric solutions are numeric functions that give us the optimal allocation of capital and oil wealth for any given state of capital, oil wealth and rate of return in the international marked. More details about the numeric procedures will be given in section 2.4.

In the steady state, the relation between the marginal utilities is equal to 1. The valuation of physical capital is equal across time. From equation 13, we can therefore express capital in the steady state as a function of the parameters α, β and δ.

$$k^* = \left(\frac{\frac{1}{\beta} - (1 - \alpha)}{\alpha} \right)^{\frac{1}{1-\alpha}}$$

2.3 Parameterisation based on the Norwegian economy

2.3.1 The rate of depreciation of capital

Along the balanced growth path, the rate of depreciation is equal to investment-capital ratio. This is derived from the low of motion of capital on the steady state.

$$k = (1-\delta)k + x \Rightarrow k - k = -\delta k + x \Rightarrow 0 = -\delta k + x \Rightarrow \delta k = x$$

$$\frac{x}{k} = \delta$$

Base on the Norwegian long run data, the average investment/ capital ratio in the Norwegian economy is equal to 0, 07. We therefore set the rate of depreciation equal to the average long run value the ratio investment/ capital. So, $\delta = 0, 07$.

2.3.2 Capital share of output

In our model we have abstracted from labour leisure decisions. Labour input is not included in the production function. However we can still use the information related to labour in the actual economy in order to estimate the value of the labour share of total income. The average labour share of output from the Norwegian Non-oil economy is approximately equal to 0, 72 which gives a capital share of 0, 28. The labour share of output is constructed based on the data from 1970 to 2006. We use the data on the compensation to workers and the operating surplus.

2.3.3 The oil wealth

In order to adjust the value of the oil asset to the model value of capital in steady state, we compute the amount of oil wealth in terms of the model steady state value of physical capital, which in turn depends on the values the structural parameters of the economy. We take the value of the Norwegian oil fund in 2006 and assume no further transfer into the fond from there. The market value at 31.12.06 was 1784 billions of NOK, while the non-oil fixed capital was estimated to be 4 067 954 millions NOK. These two values give a ratio oil wealth / capital of 2, 8. We will compute the asset value for our advanced model economy to be 2, 8 times the model value of capital.

We have alternatively constructed an estimate wealth oil/capital 5, 6, that is assumed to correspond to the Angolan economy. Whether we use 2, 8 or 5, 6 representing the ratio oil wealth capital, it does not seem to affect the essence of the numeric solution. We will therefore only use 2, 8.

2.4 The decision rules

We have a tri-dimensional value function, depending on the amount of physical capital, the amount oil resources and the exogenous rate of return in the international marked. With the numeric value function iteration we derived 3-dimnesional decision rules. Decision rules are unique mappings from state space to actions. For each possible combination of state variables, capital, oil and rate of return, the decision rule for capital gives the optimal amount of capital to be left for next period production.

Given the current amount of capital, oil resources and the exogenous rate of international return on oil wealth, the decision rule for oil asset will give us the optimal amount of oil wealth next period.

Likewise, given the current amount of physical capital, oil revenues and the exogenous rate of return on the financial oil asset, the decision rule for consumption will give us a unique optimal amount of consumption in current period.

In a continuum state space there is an infinite amount of decision rules. We simplify the problem by considering a set of discrete values of the state variables around the equilibrium. By equilibrium we mean, capital in steady state, the international rate of return at the expected value 1, 04 and the oil wealth its is value of 2,8 times capital in steady state.

We construct a grid space around the equilibrium amount of capital and a grid space around the equilibrium amount of oil wealth. The number of grids is 27. We have therefore 27 possible states for capital and 27 possible states for asset. Finally we construct a vector of 27 random rates of return on the international marked, with expected value equal to 1, 04.

We have $27 \ X \ 27 \ X \ 27$ possible combinations between the endogenous state variable capital, the endogenous state variable asset and the exogenous rate of return on asset in the international marked. We can therefore derive $27 \ X \ 27 \ X \ 27$ decision rules for capital, $27 \ X \ 27 \ X \ 27$ decision rules for consumption and $27 \ X \ 27 \ X \ 27$ decision rules for asset, all the rules coming from the same underlying principle.

We have chosen to condition the decision rules and derive a smaller amount of rules that hopefully will give us enough information about the general principle derived from the stochastic optimization. By setting a condition on the state variables and plotting what we call “conditional decision rules”, we are able to get enough information that would sustain our neoclassical analyses.

For instance, by fixing the capital at the steady state, letting asset vary freely and controlling for (that is, studying what happen at each state of the exogenous rate of return), we derived conditional decision rules for capital. For each state of the rate of return on asset in the international, we can derive a conditional decision rule on capital. There are 27 such rules that can be derived.

Similarly by fixing the rate of return of oil asset in the international market at 1, 04, and letting asset vary freely, 27 decision rules for capital can be derived. By conditioning the decision rules, we have reduced the dimensions and made it possible to plot figures, by which we guide our discussion.

By either fixing capital at the steady state or fixing the rate of return in the international marked, and letting the asset vary freely in all the cases, we have derived 54 decision rules for asset, 54 decision rules for consumption and 54 decision rules for capital. We have then plotted each decision rule against capital and against the international rate of return.

Table 1 gives 12 different categories. In total we have plotted 12X27 figures; all presented in appendix 2 that also contains instruction on how to read them.

Table 1: The decision rules in categories.

The decision rules in categories						
Case	Decision rule for	Fixed state variable	Free variable	The changing state variable	Plotted against	Page
1	asset	capital	asset	rate	rate	67
2	asset	rate	asset	capital	rate	81
3	asset	capital	asset	rate	capital	95
4	asset	rate	asset	capital	capital	109
5	consumption	capital	asset	rate	capital	123
6	consumption	rate	asset	capital	capital	137
7	consumption	capital	asset	rate	rate	151
8	consumption	rate	asset	capital	rate	165
9	capital	capital	asset	rate	capital	180
10	capital	rate	asset	capital	capital	194
11	capital	capital	asset	rate	rate	209
12	capital	rate	asset	capital	rate	223

Table 1, is intended as guide to read the figures, in which decision rules are plotted against capital and against the rate of return. The same table is present in the Appendix 2 with explanations on how to read the plots.

2.4.1 Summary of the results

We now summarize the main results in each case. We are interested in capturing the general implication of the decision rules, by observing the shapes of the rules plotted either against capital or against the international rate of return. Furthermore, we want to study the impact of changes on the state variables capital and the rate of return on the international asset. The question is whether the plotted rules are affected, by changing states and how strong is the effect. All cases will not be equally weighted. We will pay particular attention to the decision rules and plots that we believe will give more relevant information concerning our goals.

2.4.1.1 The stochastic decision rules for asset

From case 1 we observe that the decision rules for asset plotted against the rate of return, is generally increasing with the rate of return. The decision rule, conditioned on capital being at steady state, changes as we change the state of international rate of return on the oil asset. In most states of rate of return, the rule maintains the general increasing pattern, suggesting less and less consumption of oil when the rate of interest is high. In the two extreme states (very high or very low rate of return) however the rule seems to suggest that the rate of return does not affect the amount of oil consumption.

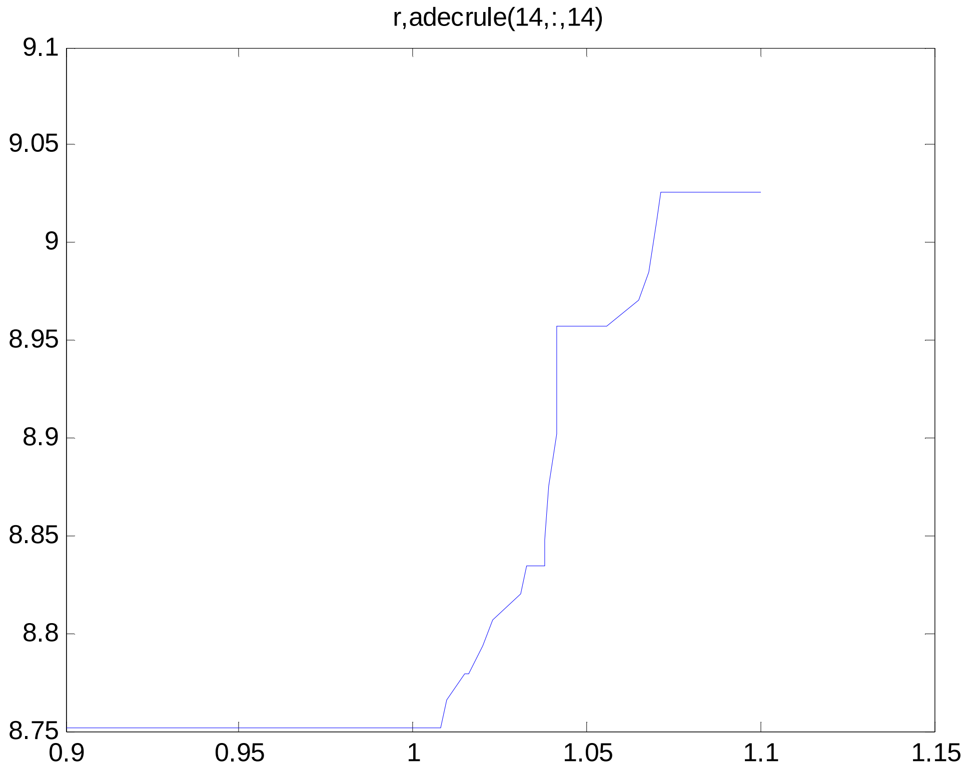

Figure 1: Decision rule for asset plotted against the rate of return. In spite been conditioned on both capital and the rate of return in equilibrium, the rule is not smooth, suggesting very volatile consumption of oil, due to changes in the rate of return. The rate is presented in the horizontal axis.

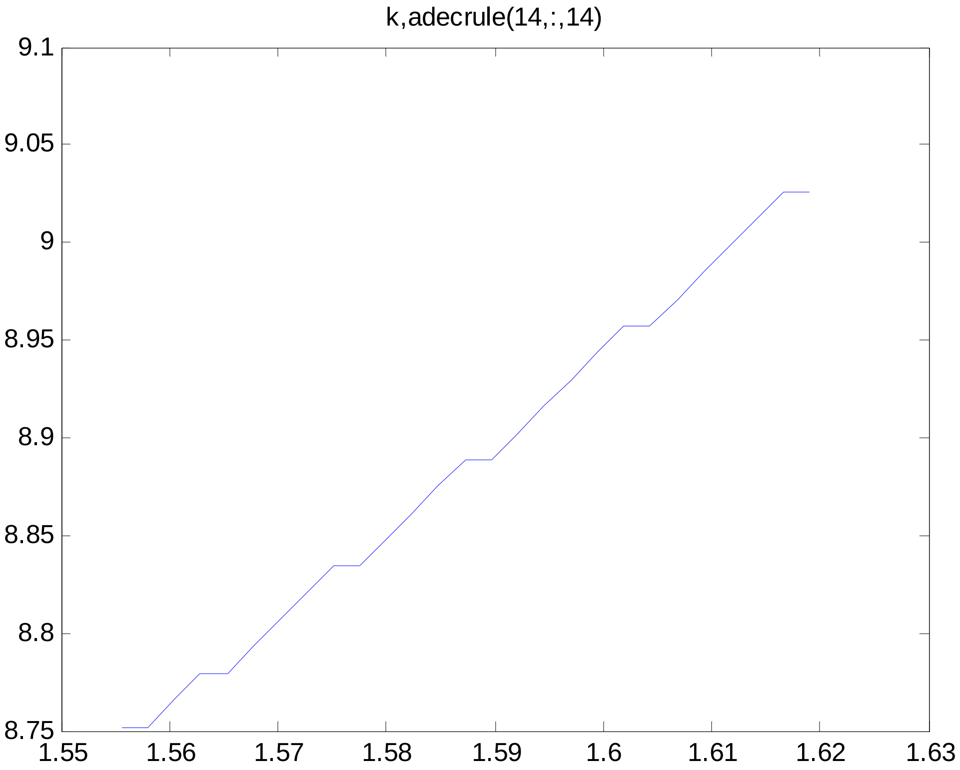

Figure 2: decision rule for asset plotted against capital. The rule is conditioned on both capital and rate of return being in equilibrium. The ratio capital/ asset tomorrow decreases. The more capital the there is for today production, less oil revenues are used today and more oil is left for tomorrow. Capital is represented in the horizontal axis.

In case 2 we fix the rate of return, and study the behaviour of the asset rule plotted against the rate of return, at each state of capital, as exemplified in figure 1. The resulting pattern is somewhat similar to the previous case. But the difference is that we no longer observe the flat cases. For all the possible states of capital, the optimal amount of oil consumption is positively affected by the rate of return. Changing the state of capital will have impact on the shape of the rule. We have one new rule for each state. The rules are very volatile, not smooth.

In case 3, we observe the same flat pattern when the rate of return takes the extreme values. Case 3 suggest that also capital does not have any impact on the decision rule for asset, at the state in which the rate of return is either very high or very low. However In the intermediate state where rate is at its equilibrium state case 3 displays smoother decision rule for asset conditioned to capital being on the steady state. The rule is slightly steeper than the 45 degree line. The interpretation is that the ratio between capital and asset next period amount of oil wealth decreases as capital increases.

In case 4 the asset rule is conditioned on the rate on return in equilibrium and plotted against capital. At the state in which capital is very high the rule is steeper, implying that the ratio between capital and asset tomorrow is lower compared to the equilibrium case. At the other extreme case the rule seems to get flatter compared to the equilibrium. In the state where capital is high, more and more oil asset is left for next period, while in time of low capital the rule demands that more oil revenues be spent today.

We can conclude this section with the common feature observed in the first 4 cases. The two conditional decision rules for asset are not immune to changes in the rate of return on asset in the international marked. They are not either immune to changes in capital.

2.4.1.2 Stochastic decision rules for consumption

We now turn to consumption. We start with case 5, where the consumption rule is conditioned at steady state level of capital. At the extreme state of the return, the consumption rule plotted against capital is smooth and steeper than the 45 degree line. The rule is steepest at the state of very low level of return in the international market. The ratio between consumption and capital is accordingly high, which may reflect larger consumption of oil revenues. With the return at the intermediate values, we can get more volatile consumption rules, as shown in figure 3.

In case 6, by fixing the rate of return, and looking at each state of capital, the volatility of consumption increases in all possible states of capital. The consumption rule plotted against capital seems to be more volatile than in case 5. The consumption does not display smooth pattern in all possible states of capital.

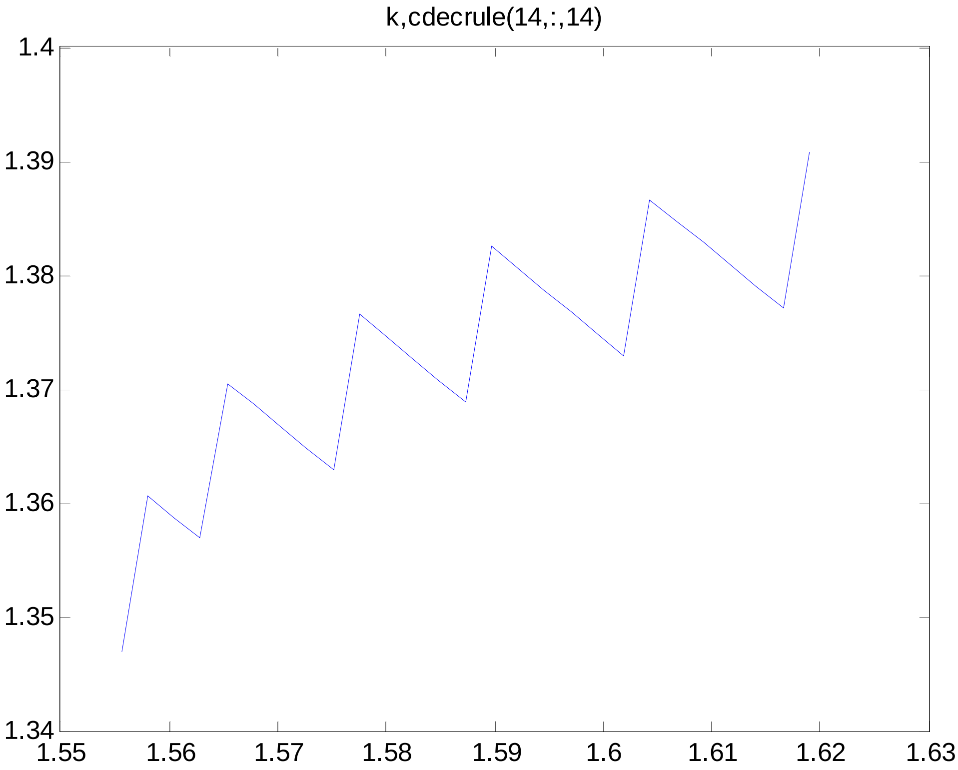

Figure 3: Decision rule for consumption plotted against capital display large volatility. The rule is conditioned on capital being steady state and on the rate of return being at its equilibrium value. Capital is represented in the horizontal axis.

Case 7 and 8 display similar patterns. The general pattern is that the rate of return on the international asset has a positive impact on the amount oil asset left for next period, which imply a volatile ratio between consumption and the rate of return. The rules are either sensible to changes in the state of capital or sensitive to changes in the state of the rate of return in the international market. They display however almost the same pattern at different states, suggesting that the impact of changing states of the rate is light.

2.4.1.3 Stochastic decision rules for capital.

We finally look at the conditional decision rules for capital. Along the 45 degree line, the amount of capital in current period is equal to the amount of capital next period.
In case 9, all the resulting decision rules are smooth. As we change the state of rate of return from low to high, the decision rule for capital conditioned on capital being fixed on steady state seems to get flatter, implying that ratio capital today / capital tomorrow increases.

We get similar results in case 10. The difference however is that fixing the rate of return seems to produce a decision always closer to the 45 degree line, suggesting that the impact of changing the state of capital is lower, than the impact of changing the state of return. The convergence of capital is clear in all the states of capital. Figure 4 shows the equilibrium case.

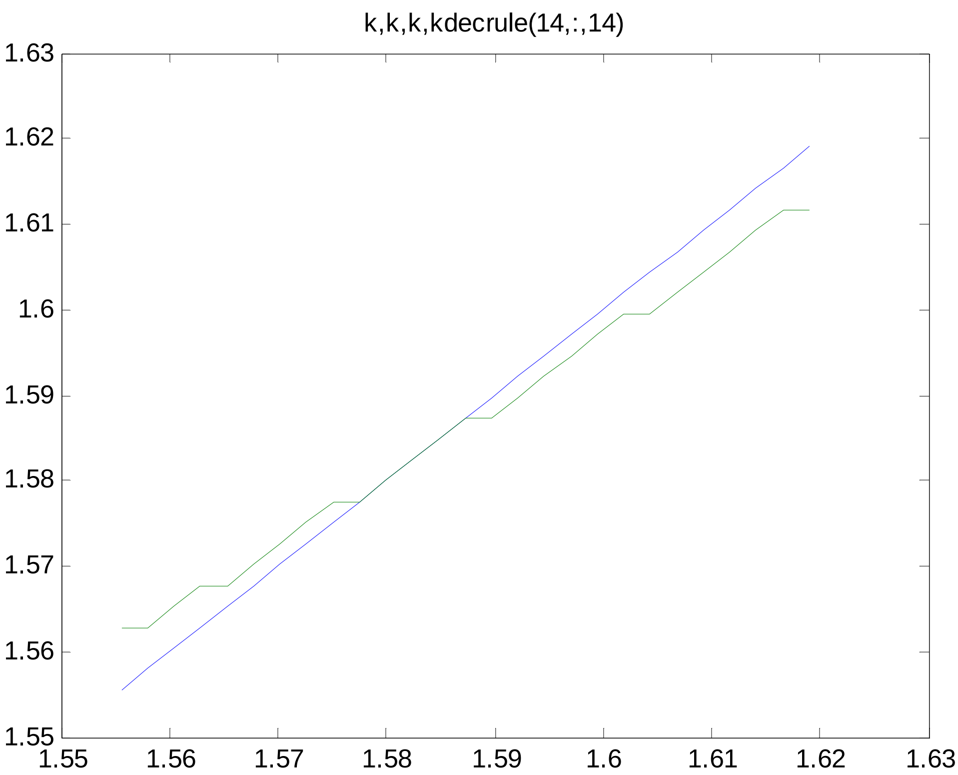

Figure 4: Decision rule for consumption conditioned on capital and rate being in equilibrium. The rule plotted against capital displays smooth pattern and shows convergence.

The observations from case 11 and 12 suggest a more volatile shape of the decision rules for capital, whether we fix capital or asset. The rate of return on the oil asset in the international marked seems to lead to sudden changes in the allocation of capital, as exemplified in the figure 5.

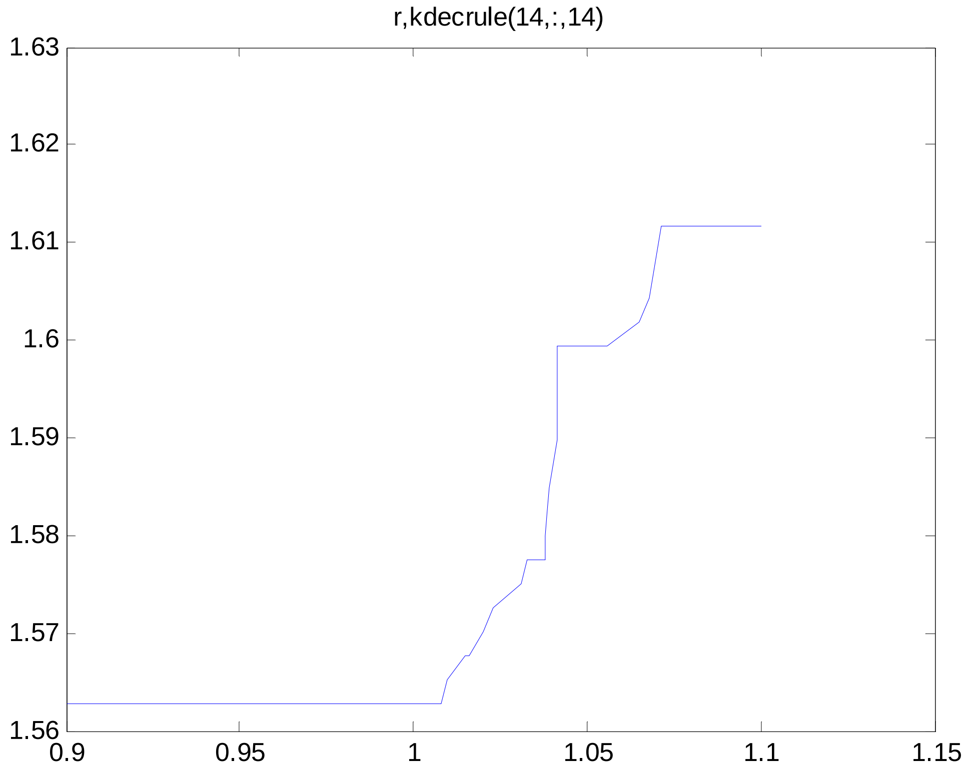

Figure 5: Decision for capital, conditioned on capital and the rate of return being in equilibrium. Plotted against the rate of return, it displays a volatile pattern.

2.4.2 Changing rules in a changing world. Generalizations from the stochastic decision rules

In the previous section we have carefully looked at a set of decision rules for capital, for consumption and for oil asset. All the rules are conditional, in the sense that one state variable is fixed to a constant. We can now make some generalizations. Firstly, a set of decision rule derived from the same general model gives different recommendations on the optimal amount of consumption, optimal allocation of capital and on the optimal amount of oil revenues to be left for next period provision of public goods. Secondly, the common feature however is that none of the studied decision rules is immune to changes in either the state capital or the state of the international rate of return. The conditional decision rules vary across economies and across time as the state of the economies changes, although the underlying principle is the same.

With these generalizations in mind we move to the next chapter, where we will derive a further ramification from the same stochastic underlying principle that we have used in this chapter. We will reveal the essence of the Norwegian “Handlingsregelen”.

3. The Essence of the Norwegian decision rule

We now consider an economy along the balance growth path, from which we can de-trend the technological growth. The consumption of the private good is then constant across an infinite number of generations. Consistent with the idea of constant income or consumption any additional wealth derived from exploration of finite resources like oil, must be equally distributed across generations, such that an infinite number of generations get the dividends. The additional wealth must be managed in a may that does not disturb the already pre-existing constant consumption profile. We will in this chapter show the best way to achieve that goal.

We start with the resource constraint $c_t + g_t = k_t^{\alpha} + (1-\delta)k_t - k_{t+1} + a_t - \frac{a_{t+1}}{r_t}$ and derive a new resource constraint that incorporates the fact the model economy is now in steady state. The new budget constraint is,

$$C_t = k^{\alpha} - \delta k + a_t - \frac{a_{t+1}}{r_t}. \qquad (8^*)$$

The rate of return has an average r equal 1, 04. Oil wealth that is not consumed in the current period is expected along the balance growth path, to grow at the rate 1, 04. k is the steady state amount of capital, which is constant .

The inter-temporal problem reduces therefore to finding the optimal amount of oil revenues to be left for next period. Using the same recursive structure the solution is given by the same decision derived in chapter 2. The decision rule for capital is now redundant, because capital is constant. The decision rule for consumption should now only be a function of the asset decision. We can therefore separate from the production sector, the decision about optimal allocation of oil wealth.

As result of that separation, we have cut the link between the changes in capital and changes in consumption. The only remaining source of fluctuations in consumption is the exogenous rate of return. In bad times in the international marked the amount of oil wealth decreases. In good state the oil wealth increases.

Just by saving all the revenues in a fund and only use the returns, we can manage to "keep the capital intact" yielding services for an infinite number of generations. We will however have fluctuations in the pattern of consumption. We can maintain the wealth constant, but we can not avoid stochastic consumption. We want therefore to adopt a rule for spending oil revenues that is immune to changes in the rate of return on oil wealth in the international market.

3.1 Analytic approach

Each period we want to find the optimal share of oil wealth to be consumed. The share should be immune to changes in rate of return and should keep the consumption equal across generations. Furthermore we should be able to maintain the wealth constant on the average. We know that on the average the wealth grows 4% per period.

We introduce a parameter (variable) ρ, denoting the share of the current oil wealth that is consumed by the representative agent**.** The value of ρ should achieve all the goals, both equal distribution and maintain the wealth intact at same time being immune to stochastic short run changes in the international marked.

$$g = \rho a_t = a_t - \frac{a_{t+1}}{r}$$

We denote C as consumption of private and public goods, $c + g$. Using the Euler condition, and re-gaining the prime notation to denote recursive structure, we get,

$$C = \beta r C' \Rightarrow (c' + g') = \beta r (c' + g')$$

$$c' = c \Rightarrow g' = g$$

$$g = a' - \frac{a'}{r} = g' = a' - \frac{a'}{r}$$

$$\rho a' = \rho a \Rightarrow a' = a$$

$$\rho a = a - \frac{a}{r} \Rightarrow \rho a = ar - \frac{a}{r} r \Rightarrow \rho a = ar - a \Rightarrow \rho = r - 1 \Rightarrow 1{,}04 - 1 = 0{,}04$$

We should therefore consume 4% of the available asset each period that is the equivalent of the expected return on the asset. By just consuming the equivalent of the expected return on the wealth, the wealth is kept constant and the amount of oil consumption is equal across generations. The Norwegian rule Handlingsregelen follows the same principle. The only difference is that in reality the amount of oil wealth increases as new transfers are injected into the fund. However taking into the consideration the demographic changes in Norway, as discussed in Henriksen (2008) , the rule is such that equal amount of oil revenues per person is equal across many generations.

3.2 The numeric approach

We need the numerical rule of the optimal spending share in order to determine whether the consumption expressed as function of the asset rule is affected by the changes in the state of the international market. We have seen in chapter 2 that the asset rule is not immune to changes in the rate of return. We expect the numeric decision rule for the share to be however immune to the stochastic shocks in the international market.

Because we want to maintain asset constant across time, we use $\rho a' = \rho a \Rightarrow a' = a$, that implies that asset today is equal to asset tomorrow. We therefore use the relation $\rho a = a - \frac{a}{r}$, and replace a with the numeric decision rule for asset in all possible states and derive the numeric tri-dimensional ρ , which is equal to 0, 0385 in all possible combinations of state variables capital, rate of return and oil asset. This value derived from the general principle of our numeric optimization is close enough to 0, 04. It is an approximated value, given that the asset rule is derived from an approximated value function.

A new consumption rule is derived using the new resource constraint (8), and conditioning the numeric ρ , on the return being in equilibrium.

The new consumption rule plotted against the international rate of return on the oil asset is flat. The optimal consumption rule is immune to changes in the international marked, as shown in figure 6, where c_t contains both oil and private goods.

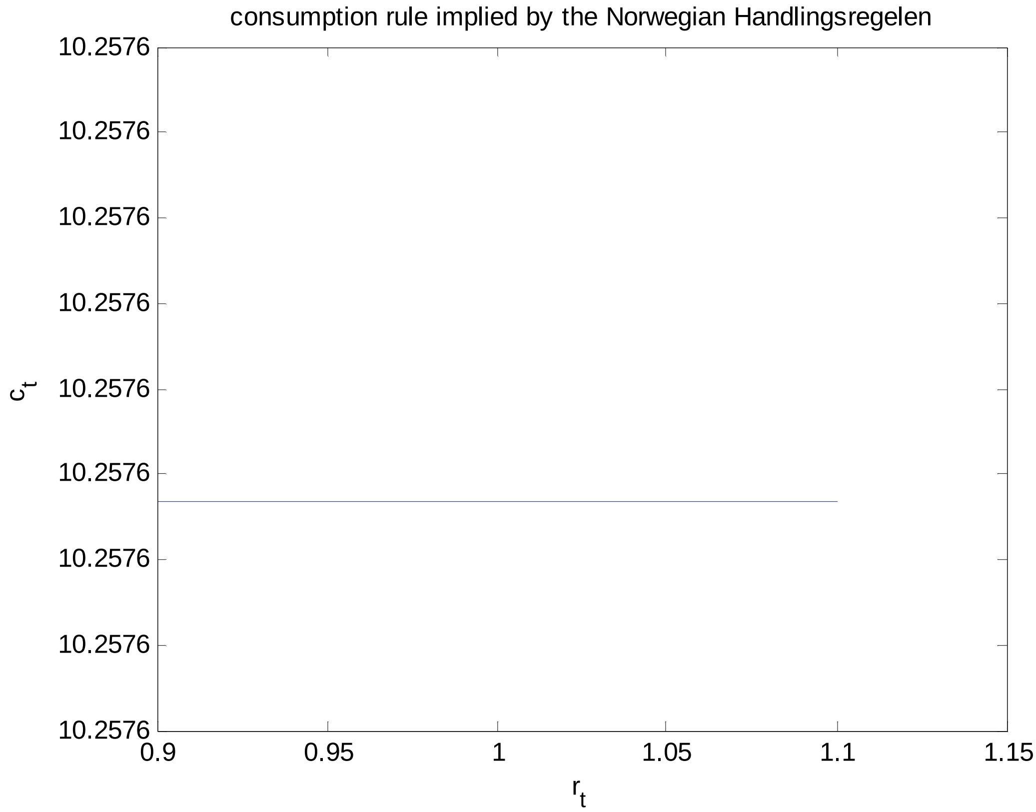

Figure 6: The new consumption rule implied by the Norwegian rule is constant when plotted against the exogenous rate of return in the international market.

Alternatively, we can abstract from the mainland sector and just plot the consumption of oil against capital. The result is the same. Public provision of goods, denoted by Hr in the figure 7 is not affected by the state of the return on asset in the international market.

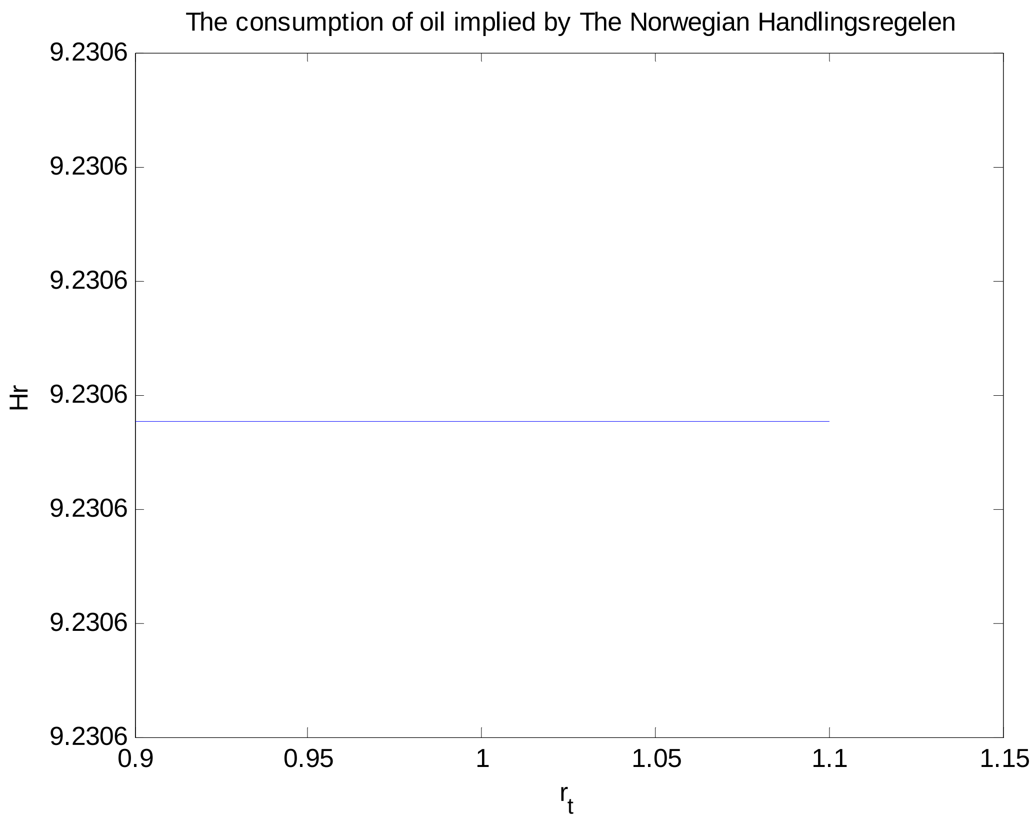

Figure 7: The provision of public good is not affected by changes in the exogenous rate of return in the international market.

In the next chapter we apply the rule in the model economy outside the balance growth path and make generalizations corresponding to the Angolan economy.

4. The model economy below the steady state

We have seen in the previous chapter that equal distribution of finite oil revenues across infinite number of generations is possible, maintaining the same standard of living across generations.

In the case a transition economy, achieving intergenerational distribution is not always consistent with equal distribution of oil revenues across time. One reason is that the optimal allocation of oil wealth along the transition path can not be separated from the optimal allocation of capital. Low physical capital implies low consumption of privately produced good. To reduce the differences in standard of living across the transition path, the generations far from the balanced growth path should spend more oil revenues, if one wants to achieve inter-generational equity. A second reason is related to the marginal productivity of capital. The return on capital is higher the further below the economy is from the steady state. Oil revenues should be invested in the economy, either in form of direct provision of public goods, or in form of investment in accumulation of physical and human capital, if its value is higher than the alternative application.

Following the spending rule similar the Norwegian policy, would succeed in maintaining the amount of oil wealth across different infinite number of generations, but it will not solve the problem of volatility in consumption, neither bring inter-generational equity. In figure 8 we have plotted a new consumption rule based on the old budget resource constraint. For plotting purposes we have taken out the decision rule for capital. We know from chapter 2, that the decision rule for capital is affected by the rate of return in the international market. Therefore leaving the capital rule out should not affect our result. It should on the contrary reduce the volatility.

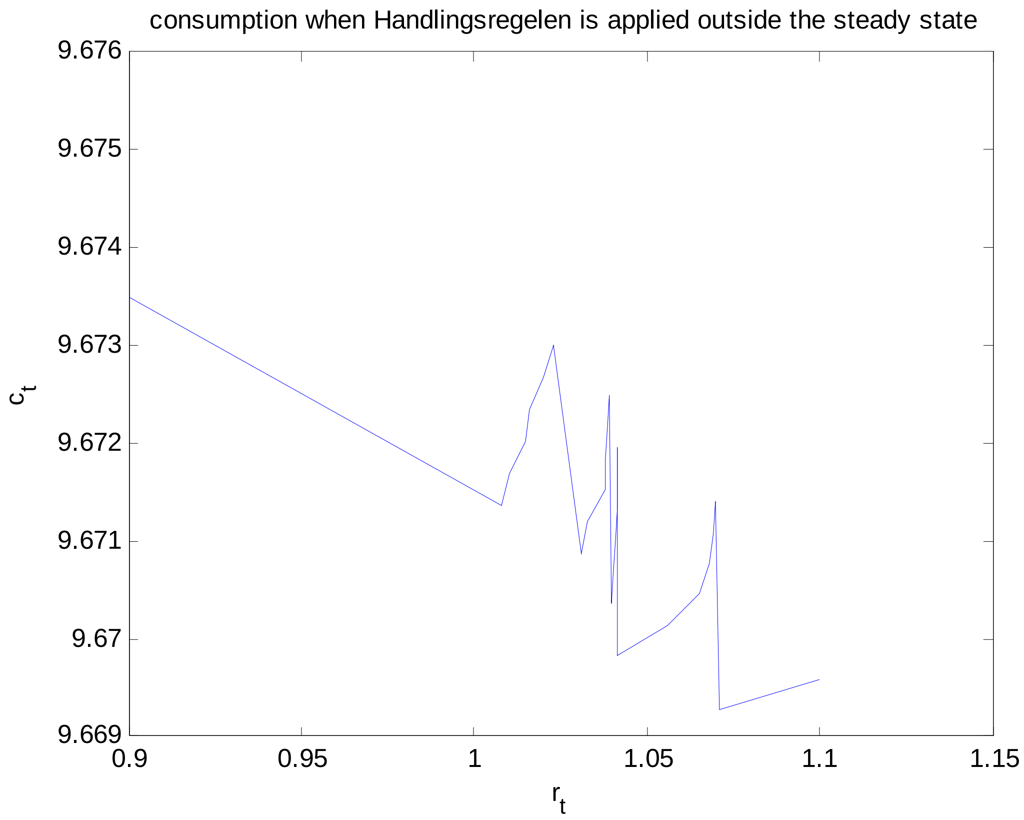

Figure 8: Consumption, including the provision of public good is affected by changes in the exogenous rate of return in the international market, when the rule is applied in an economy below the steady state.

The new consumption rule corresponds to the economy outside the balance and adopts the Norwegian rule. It is plotted against the rate of return on oil wealth in the international market. Contrary to the case of constant provision of public good, applying the Norwegian rule outside the balanced growth path would imply volatile consumption. High rate of return on the international marked would imply less consumption, while low rate would imply low consumption.

4.1 Should Angola adopt the Norwegian rule?

The Angolan economy is still in a period of recovery from a sequence of negative shocks. The economy is still below its own transition path, abandoned after independence in 1975. The recovery period is projected to be completed in 2012, a year from each the rate of growth will be reduce from today’s double digits number to a more sustainable rate around 5% until 2027.

In spite of very high growth rates, the non-oil sector is largely below its pre – independence performance. Physical, financial, infrastructural and human capitals are still scarce.

The Angolan economy can be considered close enough to its own steady state at a point where the GDP per capita is at least the half of the actual US level. We have come to that estimate by using the method applied by Charles Jones (1998), when studying the fit of the neoclassical growth model. He had derived the long run income ratios relative to US predicted by the model, by applying the US benchmarks values of 0, 3 for capital share of output and 0, 05 for depreciation rate for all the countries and by using the data on population growth and investment rate. The estimates from Solow model were compared to the actual relative income for a group of developing countries.

We have also studied historical data from 1960 to 1975 and abstracted from the shocks after independence and civil war, plus used the growth projections from Word Bank and International Monetary Fund. We concluded that the Angolan economy will still be in transition for at least two more decades, even assuming that stability and peace process are irreversible.

Applying the Norwegian decision rule to Angola, would not eliminate volatility in government spending, but would succeed in spreading the oil consumption across all the generations. It would therefore imply a volatile and unequal consumption pattern, on the short run, but oscillating around a sustainable constant average, until the point where the economy converges to the steady state. In spite of volatility, one can see at least two advantages for such equal distribution on average. Firstly, applying the rule would avoid a sudden decline in the standard of living, in the years after oil resources dry out, 2031, assuming that the non oil sector does not grow enough to cover the decline. Secondly it would achieve intergenerational equity if the economy converges to the steady state. By the time when the balanced growth path is reached, an oil fund and policy rule is already in place. Intergenerational distribution similar to the Norwegian model is then achieved from the steady state to all the infinite number of generations.

These two advantages can be contrasted however with two costs. On the one hand, consumption is volatile along the transition path. On the other hand, we have the alternative cost of having large amount of oil wealth in a fund when the alternative application in the economy far bellow the steady would yield higher return. Investing in the economy would lead to a faster transition toward the steady, therefore a faster transition to appoint from where equal distribution across generations is possible. Furthermore there is the cost of sharp decline of consumption from the time when the rule starts being implemented. The Angolan government budget is sustained by oil revenues that cover more than 60% of public expenditure. Although applying the rule would avoid a sharp decline in public consumption when the resource dries out, it will also cause a sharp decline now if the rule is adopted.

The costs of imitating the Norwegian model should reinforce the rational for more consumption of oil by the current generation, in form of better and improved public services and in form of increased investment in physical and human capital. Future oil revenues should be transferred to the current generations, laying the ground for increased non –oil productivity for a large number of future generations. Equal distribution of oil revenues across generations should not only be achieved via financial asset, but also via physical capital. Oil resources should be invested in “machines” that yields services to a large number of generations.

Angola, as result of its reconstruction effort, has benefited from loans from China. The time when Angola gets a credit of more than 3 billion dollars, coincides with the time when the Chinese demand for oil has increased. From a neoclassical point of view there seems to be a good reason for such borrowing that can be interpreted as transfer of future oil revenues to the current generations. Following the Norwegian rule will not be consistent with such transfers.

However, as to be pointed in the next chapter, if one takes into consideration the quality of institutions and relax some assumption of perfect substitution between the public good and private good, relax the assumption of a benevolent central planer, some implications derived in this section can be questioned.

5. Looking beyond the neoclassical framework

We have used on optimization approach based on the assumption of a benevolent central planer and perfect substitution between public good and private consumption. We have applied a solution derived from the neoclassical optimization framework and generalized it to derive policy implications for Angolan economy. The neoclassical implication that the Angolan government should use more oil revenues today can be contrasted with the following arguments:

Firstly, the idea of benevolent central planer may at this early post war stage not yet be the best approximation of the decision making process in the country. The utility function and consequently the life time utility function used in the neoclassical maximization framework may not be enough representatives concerning the goals of a central planer with self-centred interests. Furthermore, even if the decision maker is mostly benevolent, he would face institutional and political constraints, related to lobby groups, power rivalry, and general short-sightedness in the culture and may then find it difficult to commit himself to a spending rule that is consistent with the neoclassical forward looking decision making process. The quality and quantity of investments may be affected by other interests rather than the maximization of the utility of the representative consumer. Lobby groups, political parties and a number of business associations and of national and international competing interest groups may influence the decision-making process. Consequently, the large amount of public spending could not always be proportional with the improved quality and quantity of public services. Although the armed conflict is over, the long term effect of rent seeking and corruption may still persist.

Consequently, the assumption of perfect substitution between public good and private good may be questioned, by the fact that one unit public good does not necessarily yield the same utility as the private good.

Secondly, searching for answer for the core questions of our thesis we have used a neoclassical model economy outside the balance growth. However based on our numeric approach in which we approximated the value function, we have constructed a deviation which is not necessary correspondent to the deviation of Angola and of most of resource-rich developing countries far away from the long run growth path. The model economy although outside the equilibrium path can be very close to the steady compared to the actual Angolan economy deviation. Furthermore, the projection on the possible convergence to the steady state can actually be affected by political and institutional changes. The convergence time toward the de-trended long run growth path may be slower than the projections suggests. Political and institutional risks may persist, even when relative stability is achieved and maintain in the economy over long time. So, the neoclassical convergence is not always smooth. New successive shocks my affect the growth projections.

Thirdly, the political economy can create different incentives not consistent with the neoclassical framework. Politicians in pursuit of unclear interests may overspend the revenues from natural resources even if the economy is on the balanced growth path, ignoring the need for future generations. If the economy is far from the stable path, a self-centred politician may use the excuse from the neoclassical framework to justify the transfer of future revenues to the present. Those revenues might be used in unclear projects that do not necessarily increase the living standard of the current generations.

Returns from a wealth fund might be higher than the return on the “investment” in the economy, due to bad quality of the investments. In the long run there seems to exist a clear support for not overspending the oil wealth in time when the quality of institutions do not guarantee the quality of the projects and the results expected from public investments are not achieved. When the economy is the transition path, the neoclassical costs of adopting a policy after the Norwegian model may pale in comparison to the costs of following the neoclassical recommendations, when the assumptions of the model economy are not close enough to the description of the actual economy.

Generally resource funds with restrictive arrangement and rules that regulates the quantity and quality of spending are believed to have a positive impact on the quality of institutions. However there is not enough evidence that such funds improve the quality of institutions or that the objectives that they are set to achieve are actually accomplished. As discussed in Humphreys, Macartan and Sandbu, Martin E.(..), politicians that spend resource revenues badly when there is no resource fund, will also spend resource badly when the fund is established. Political economy and instutional factors in developing countries have to be considered. So, although questioning most of results we derived from a neocalssical perpective, introducing instutions in the analyses does not give a clear support to the application of the Norwegian model as a way out of the resource curce.

6. Conclusions

We have used a neoclassical framework to find the optimal path for spending finite resources across generations. The question we are set to answer is whether there is a neoclassical rational that support the idea that oil rich developing country should save their oil revenues and adopt a policy rule similar to the Norwegian model.

We have chosen to focus on Angola, as a representative case of a developing country affected by the natural resource curse, here defined as the tendency of resource rich countries failing, due to rent seeking, Dutch disease and volatility in government spending. Angola has a history of civil war, financed through natural resources and is now facing a new era of peace and stability. Most of public services are financed by the natural resources and the government budget is projected based on the estimates of oil production. There is a risk for an abrupt decline in government spending, when the resources die out.

We have found that the different optimal paths can be derived from a general neoclassical principal that evolves from our stochastic programming in which we approximated value function numerically. We have computed a number such decision rules and shown that rules changes across time. We have given the essence of the Norwegian decision rule and shown that it's a rule that is consistent with the three key objectives: maintain the oil wealth constant, distribute the wealth equally across generations and avoid the impact of exogenous stochastic shocks from the international market. By achieving those three objectives, the Norwegian rule succeeds in avoiding resource curse, here specially defined as volatility in consumption. The Norwegian rule can therefore be considered as solution to resource curse in developing countries.

We have however found that contrary to the Norwegian economies, developing countries economies are best described as economies not along a balanced growth path. We have therefore used the implication derived from the model economy outside the balance growth path to conclude that:

The neoclassical framework does not support that oil fund and related policy rule after the Norwegian model be applied in Angola, if the main objective is to avoid volatility in public spending. On the other hand, applying the Norwegian model in Angola can succeed in maintaining the oil wealthy constant across an infinite number of generations. The rule would however have a different implementation in Angola, due to the fact that the same decision rule would now imply a volatile consumption. One reason found in this thesis is that we can not separate the mainland economy, when determining the optimal amount oil consumption. While in the Norwegian economy finding the optimal allocation of oil wealth across generation amounts to choosing the path that keeps the consumption that is already stable in the first place, applying the rule in Angola would have a different implication.

Although the rule may maintain the wealth across generations in Angola, it will not be able to avoid the volatility mainly caused by exogenous shocks on the rate of return on asset in international market. It would imply an unstable consumption path along the long transition period that the Angolan economy is in, before it eventually reaches the steady states.

So, answering to the core questions, we would say, that the long run government spending of oil revenues in Angola will be maintained around a constant share, implying equal distribution of oil revenues on average. But it will be stochastic from period to period. The rule will not bring intergenerational equity, because the economy is far from the steady state. Secondly, applying the rule would imply a stochastic shape, not a flat line as in Norway. The rule would look different. Concerning the third question weather the Angolan government should use more of its oil revenues, the answer is mostly “no”. Although, there is a neoclassical support for using more revenues, the quality of institutions suggest that more oil revenues used does not necessary imply higher living standard. Besides, the current level is already high.

With more than 60 per cent of the budget coming from oil, the focus should now be on the quality rather than quantity of oil spending. With improved quality of institutions and therefore better quality in public investments, the rational for more oil spending through transfer from future generation may be supported. It will be consistent with the neoclassical view.

Our neoclassical analyses seems not to support the implementation of an oil fund and related spending rule, after the Norwegian model, as a way out of the natural resource curse. Implementing the rule in developing countries does not solve the volatility in public spending. A look beyond the neoclassical framework does not seem to suggest a different conclusion.

Because most of oil rich economies are not on the balanced growth, our analyses suggest that the Norwegian model should be kept Norwegian, until Angola and other oil rich developing countries eventually come close enough to a balanced growth path.

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Appendix 1: Matlab Codes

```
clear all
close all
% Master thesis 2008.  by Joaquim  Damiao
%Stochastic program. Deriving the general dec.rules for consumption,
%capital and asset

%Structural parameters
alpha=0.28;
delta=0.07;
sigma=2;
%betha =1/rstar

%number of exogenous states r
gr=27;
r=[0.9,1.008
1.010,1.015,1.016,1.020,1.023,1.031,1.033,1.038,1.0381,1.0384,1.039,1.040,1
.0401,1.0412,1.0413,1.04131,1.0414,1.0415,1.056,1.065,1.068,1.0690,1.070,1.
07113,1.1];
%probabilities for exogenous var. r
p=[0.0005,0.0006,0.0007,0.0008,0.0080,0.0091,0.012,0.017,0.021,0.026,0.027,
0.028,0.04,0.17, 0.1482,0.13,0.12,0.1,0.11,
0.009,0.007,0.004,0.0034,0.0032,0.0021,0.00140,0.0010,];
sum(p)
sum(p.*r)


rstar=sum(p.*r); % must be equal to 1.04
sum(p)% equal to 1
betha = 1/rstar;

%Define the number of discrete values of k and set k grid space
kstar=((1/betha-(1-alpha))/alpha)^1/(1-alpha);
gk=27;
k=linspace(0.98*kstar,1.02*kstar,gk);

% asset relative to capital in steady state and asset grid space.
ga=27;
astar=2.8*kstar; %#ok<NASGU>
astar=5.6*kstar;
a=linspace(0.98*astar,1.02*astar,ga);


%consumption

for h=1:gk
    h %#ok<NOPTS>
    for i=1:gk
        for j=1:ga
            for l=1:ga
              for m=1:gr
                 c(i,l,h,j,m)=k(h)^alpha+(1-delta)*k(h)-k(i)+a(j)-
a(l)/r(m); %#ok<AGROW>
                 if c(i,l,h,j,m)<0
                    c(i,l,h,j,m)=0; %#ok<AGROW>
                 end
```

```
                end
             end
          end
      end
  end
  for h=1:gk
      h %#ok<NOPTS>
      for i=1:gk
          for j=1:ga
              for l=1:ga
                for m=1:gr
                   if sigma==1;
                    u(i,l,h,j,m)=log(c(i,l,h,j,m)); %#ok<AGROW>
                   else
                    u(i,l,h,j,m)=(c(i,l,h,j,m)^(1-sigma)-1)/(1-sigma);
%#ok<AGROW>
                  end
                end
             end
          end
      end
  end
  v=zeros(gk,ga,gr);

  %The parameters for the loop
  convcrit=1E-6;
  diff=1;
  iter=0;
  while diff>convcrit
      for h=1:gk
          for j=1:ga
              for m=1:gr

                  tmpv = 0;
                  for tmpctr = 1 : gr
                      tmpv = tmpv + p(tmpctr)*v(:,:,tmpctr);
                  end

                  Tv(h,j,m)=max(max(u(:,:,h,j,m)+betha*tmpv)); %#ok<AGROW>

              end
          end
      end

      iter=iter+1;
      diff=max(max(max(abs(v-Tv))));
      v=Tv;
  end


  %derive the general decision rules
  for h=1:gk
             for j=1:ga
                  for m=1:gr
                    [z,gridpoint]=max(max(u(:,:,h,j,m)+betha*tmpv));
                    matrixrule(h,j,m)=gridpoint;  %#ok<AGROW>
                    kdecrule(h,j,m)=k(gridpoint);%#ok<AGROW> % gives capital
next period for all possible states
                    adecrule1(h,j,m)=a(gridpoint);  %#ok<AGROW> % gives asset
next period for all possible states
```

```
            end
        end
end


%general decision rule for consumption


for h=1:gk
        for j=1:ga
            for m=1:gr
              cdecrule(h,j,m)=k(h)^alpha+(1-delta)*k(h)-
kdecrule(h,j,m)+a(j)-adecrule1(h,j,m)/r(m); %#ok<AGROW>
            end
        end
end
```

```
% Plotting the decison rules

figure
plot(k,adecrule1(14,:,1))
title('k,adecrule(14,:,1)')


figure
plot(k,adecrule1(14,:,2))
title('k,adecrule(14,:,2)')


figure
plot(k,adecrule1(14,:,3))
title('k,adecrule(14,:,3)')


figure
plot(k,adecrule1(14,:,4))
title('k,adecrule(14,:,4)')


figure
plot(k,adecrule1(14,:,5))
title('k,adecrule(14,:,5)')


figure
plot(k,adecrule1(14,:,6))
title('k,adecrule(14,:,6)')


figure
plot(k,adecrule1(14,:,7))
title('k,adecrule(14,:,7)')
```

```
figure
plot(k,adecrule1(14,:,8))
title('k,adecrule(14,:,8)')

figure
plot(k,adecrule1(14,:,9))
title('k,adecrule(14,:,9)')

figure
plot(k,adecrule1(14,:,10))
title('k,adecrule(14,:,10)')
figure
plot(k,adecrule1(14,:,11))
title('k,adecrule(14,:,11)')
figure
plot(k,adecrule1(14,:,12))
title('k,adecrule(14,:,12)')
figure
plot(k,adecrule1(14,:,13))
title('k,adecrule(14,:,13)')
figure
plot(k,adecrule1(14,:,14))
title('k,adecrule(14,:,14)')
figure
plot(k,adecrule1(14,:,15))
title('k,adecrule(14,:,15)')
figure
plot(k,adecrule1(14,:,16))
title('k,adecrule(14,:,16)')
figure
plot(k,adecrule1(14,:,17))
title('k,adecrule(14,:,17)')
figure
plot(k,adecrule1(14,:,18))
title('k,adecrule(14,:,18)')
figure
plot(k,adecrule1(14,:,19))
title('k,adecrule(14,:,19)')
figure
plot(k,adecrule1(14,:,20))
title('k,adecrule(14,:,20)')
figure
plot(k,adecrule1(14,:,21))
title('k,adecrule(14,:,21)')
figure
plot(k,adecrule1(14,:,22))
title('k,adecrule(14,:,22)')
figure
plot(k,adecrule1(14,:,23))
title('k,adecrule(14,:,23)')
figure
plot(k,adecrule1(14,:,24))
title('k,adecrule(14,:,24)')
figure
plot(k,adecrule1(14,:,25))
title('k,adecrule(14,:,25)')
figure
plot(k,adecrule1(14,:,26))
title('k,adecrule(14,:,26)')
figure
plot(k,adecrule1(14,:,27))
```

```
title('k,adecrule(14,:,27)')
```

```
figure
plot(k,adecrule1(1,:,14))
title('k,adecrule(1,:,5)')


figure
plot(k,adecrule1(2,:,5))
title('k,adecrule(2,:,5)')


figure
plot(k,adecrule1(3,:,5))
title('k,adecrule(3,:,5)')

figure
plot(k,adecrule1(4,:,5))
title('k,adecrule(4,:,5)')

figure
plot(k,adecrule1(5,:,5))
title('k,adecrule(5,:,5)')

figure
plot(k,adecrule1(6,:,5))
title('k,adecrule(6,:,5)')

figure
plot(k,adecrule1(7,:,5))
title('k,adecrule(7,:,5)')

figure
plot(k,adecrule1(8,:,5))
title('k,adecrule(8,:,5)')

figure
plot(k,adecrule1(9,:,5))
title('k,adecrule(9,:,5)')



figure
plot(k,adecrule1(10,:,5))
title('k,adecrule(10,:,5)')



figure
plot(k,adecrule1(11,:,5))
title('k,adecrule(11,:,5)')


figure
plot(k,adecrule1(12,:,5))
title('k,adecrule(12,:,5)')
```

```
figure
plot(k,adecrule1(13,:,5))
title('k,adecrule(13,:,5)')

figure
plot(k,adecrule1(14,:,5))
title('k,adecrule(14,:,5)')

figure
plot(k,adecrule1(15,:,5))
title('k,adecrule(15,:,5)')

figure
plot(k,adecrule1(15,:,5))
title('k,adecrule(15,:,5)')

figure
plot(k,adecrule1(16,:,5))
title('k,adecrule(16,:,5)')

figure
plot(k,adecrule1(17,:,5))
title('k,adecrule(17,:,5)')
figure
plot(k,adecrule1(18,:,5))
title('k,adecrule(18,:,5)')
figure
plot(k,adecrule1(19,:,5))
title('k,adecrule(19,:,5)')
figure
plot(k,adecrule1(20,:,5))
title('k,adecrule(20,:,5)')
figure
plot(k,adecrule1(21,:,5))
title('k,adecrule(21,:,5)')
figure
plot(k,adecrule1(22,:,5))
title('k,adecrule(22,:,5)')
figure
plot(k,adecrule1(23,:,5))
title('k,adecrule(23,:,5)')
figure
plot(k,adecrule1(24,:,5))
title('k,adecrule(24,:,5)')
figure
plot(k,adecrule1(25,:,5))
title('k,adecrule(25,:,5)')
figure
plot(k,adecrule1(26,:,5))
title('k,adecrule(26,:,5)')
figure
plot(k,adecrule1(27,:,5))
title('k,adecrule(27,:,5)')
```

```
figure
plot(r,adecrule1(14,:,1))
title('r,adecrule(14,:,1)')
```

```
figure
plot(r,adecrule1(14,:,2))
title('r,adecrule(14,:,2)')


figure
plot(r,adecrule1(14,:,3))
title('r,adecrule(14,:,3)')


figure
plot(r,adecrule1(14,:,4))
title('r,adecrule(14,:,4)')


figure
plot(r,adecrule1(14,:,5))
title('r,adecrule(14,:,5)')


figure
plot(r,adecrule1(14,:,6))
title('r,adecrule(14,:,6)')


figure
plot(r,adecrule1(14,:,7))
title('r,adecrule(14,:,7)')


figure
plot(r,adecrule1(14,:,8))
title('r,adecrule(14,:,8)')

figure
plot(r,adecrule1(14,:,9))
title('r,adecrule(14,:,9)')

figure
plot(r,adecrule1(14,:,10))
title('r,adecrule(14,:,10)')
figure
plot(r,adecrule1(14,:,11))
title('r,adecrule(14,:,11)')
figure
plot(r,adecrule1(14,:,12))
title('r,adecrule(14,:,12)')
figure
plot(r,adecrule1(14,:,13))
title('r,adecrule(14,:,13)')
figure
plot(r,adecrule1(14,:,14))
title('r,adecrule(14,:,14)')
figure
plot(r,adecrule1(14,:,15))
title('r,adecrule(14,:,15)')
figure
```

```
plot(r,adecrule1(14,:,16))
title('r,adecrule(14,:,16)')
figure
plot(r,adecrule1(14,:,17))
title('r,adecrule(14,:,17)')
figure
plot(r,adecrule1(14,:,18))
title('r,adecrule(14,:,18)')
figure
plot(r,adecrule1(14,:,19))
title('r,adecrule(14,:,19)')
figure
plot(r,adecrule1(14,:,20))
title('r,adecrule(14,:,20)')
figure
plot(r,adecrule1(14,:,21))
title('r,adecrule(14,:,21)')
figure
plot(r,adecrule1(14,:,22))
title('r,adecrule(14,:,22)')
figure
plot(r,adecrule1(14,:,23))
title('r,adecrule(14,:,23)')
figure
plot(r,adecrule1(14,:,24))
title('r,adecrule(14,:,24)')
figure
plot(r,adecrule1(14,:,25))
title('r,adecrule(14,:,25)')
figure
plot(r,adecrule1(14,:,26))
title('r,adecrule(14,:,26)')
figure
plot(r,adecrule1(14,:,27))
title('r,kdecrule(14,:,27)')
```

```
figure
plot(r,adecrule1(1,:,14))
title('r,adecrule(1,:,14)')


figure
plot(r,adecrule1(2,:,14))
title('r,adecrule(2,:,14)')


figure
plot(r,adecrule1(3,:,14))
title('r,adecrule(3,:,14)')

figure
plot(r,adecrule1(4,:,14))
title('r,adecrule(4,:,14)')

figure
plot(r,adecrule1(5,:,14))
title('r,adecrule(5,:,14)')

figure
plot(r,adecrule1(6,:,14))
```

```
title('r,adecrule(6,:,14)')

figure
plot(r,adecrule1(7,:,14))
title('r,adecrule(7,:,14)')

figure
plot(r,adecrule1(8,:,14))
title('r,adecrule(8,:,14)')

figure
plot(r,adecrule1(9,:,14))
title('r,adecrule(9,:,14)')



figure
plot(r,adecrule1(10,:,14))
title('r,adecrule(10,:,14)')



figure
plot(r,adecrule1(11,:,14))
title('r,adecrule(11,:,14)')


figure
plot(r,adecrule1(12,:,14))
title('r,adecrule(12,:,14)')

figure
plot(r,adecrule1(13,:,14))
title('r,adecrule(13,:,14)')

figure
plot(r,adecrule1(14,:,14))
title('r,adecrule(14,:,14)')

figure
plot(r,adecrule1(15,:,14))
title('r,adecrule(15,:,14)')

figure
plot(r,adecrule1(15,:,14))
title('r,adecrule(15,:,14)')

figure
plot(r,adecrule1(16,:,14))
title('r,adecrule(16,:,14)')

figure
plot(r,adecrule1(17,:,14))
title('r,adecrule(17,:,14)')
figure
plot(r,adecrule1(18,:,14))
title('r,adecrule(18,:,14)')
figure
```

```
plot(r,adecrule1(19,:,14))
title('r,adecrule(19,:,14)')
figure
plot(r,adecrule1(20,:,14))
title('r,adecrule(20,:,14)')
figure
plot(r,adecrule1(21,:,14))
title('r,adecrule(21,:,14)')
figure
plot(r,adecrule1(22,:,14))
title('r,adecrule(22,:,14)')
figure
plot(r,adecrule1(23,:,14))
title('r,adecrule(23,:,14)')
figure
plot(r,adecrule1(24,:,14))
title('r,adecrule(24,:,14)')
figure
plot(r,adecrule1(25,:,14))
title('r,adecrule(25,:,14)')
figure
plot(r,adecrule1(26,:,14))
title('r,adecrule(26,:,14)')
figure
plot(r,adecrule1(27,:,14))
title('r,adecrule(27,:,14)')
```

```
figure
plot(k,cdecrule(14,:,1))
title('k,cdecrule(14,:,1)')


figure
plot(k,cdecrule(14,:,2))
title('k,cdecrule(14,:,2)')


figure
plot(k,cdecrule(14,:,3))
title('k,cdecrule(14,:,3)')


figure
plot(k,cdecrule(14,:,4))
title('k,cdecrule(14,:,4)')


figure
plot(k,cdecrule(14,:,5))
title('k,cdecrule(14,:,5)')


figure
plot(k,cdecrule(14,:,6))
```

```
title('k,cdecrule(14,:,6)')


figure
plot(k,cdecrule(14,:,7))
title('k,cdecrule(14,:,7)')


figure
plot(k,cdecrule(14,:,8))
title('k,cdecrule(14,:,8)')

figure
plot(k,cdecrule(14,:,9))
title('k,cdecrule(14,:,9)')

figure
plot(k,cdecrule(14,:,10))
title('k,cdecrule(14,:,10)')
figure
plot(k,cdecrule(14,:,11))
title('k,cdecrule(14,:,11)')
figure
plot(k,cdecrule(14,:,12))
title('k,cdecrule(14,:,12)')
figure
plot(k,cdecrule(14,:,13))
title('k,cdecrule(14,:,13)')
figure
plot(k,cdecrule(14,:,14))
title('k,cdecrule(14,:,14)')
figure
plot(k,cdecrule(14,:,15))
title('k,cdecrule(14,:,15)')
figure
plot(k,cdecrule(14,:,16))
title('k,cdecrule(14,:,16)')
figure
plot(k,cdecrule(14,:,17))
title('k,cdecrule(14,:,17)')
figure
plot(k,cdecrule(14,:,18))
title('k,cdecrule(14,:,18)')
figure
plot(k,cdecrule(14,:,19))
title('k,cdecrule(14,:,19)')
figure
plot(k,cdecrule(14,:,20))
title('k,cdecrule(14,:,20)')
figure
plot(k,cdecrule(14,:,21))
title('k,cdecrule(14,:,21)')
figure
plot(k,cdecrule(14,:,22))
title('k,cdecrule(14,:,22)')
figure
plot(k,cdecrule(14,:,23))
title('k,cdecrule(14,:,23)')
figure
plot(k,cdecrule(14,:,24))
```

```
title('k,cdecrule(14,:,24)')
figure
plot(k,cdecrule(14,:,25))
title('k,cdecrule(14,:,25)')
figure
plot(k,cdecrule(14,:,26))
title('k,cdecrule(14,:,26)')
figure
plot(k,cdecrule(14,:,27))
title('k,cdecrule(14,:,27)')
```

```
figure
plot(k,cdecrule(1,:,14))
title('k,cdecrule(1,:,14)')


figure
plot(k,cdecrule(2,:,14))
title('k,cdecrule(2,:,14)')


figure
plot(k,cdecrule(3,:,14))
title('k,cdecrule(3,:,14)')

figure
plot(k,cdecrule(4,:,14))
title('k,cdecrule(4,:,14)')

figure
plot(k,cdecrule(5,:,14))
title('k,cdecrule(5,:,14)')

figure
plot(k,cdecrule(6,:,14))
title('k,cdecrule(6,:,14)')

figure
plot(k,cdecrule(7,:,14))
title('k,cdecrule(7,:,14)')

figure
plot(k,cdecrule(8,:,14))
title('k,cdecrule(8,:,14)')

figure
plot(k,cdecrule(9,:,14))
title('k,cdecrule(9,:,14)')



figure
plot(k,cdecrule(10,:,14))
title('k,cdecrule(10,:,14)')
```

```
figure
plot(k,cdecrule(11,:,14))
title('k,cdecrule(11,:,14)')


figure
plot(k,cdecrule(12,:,14))
title('k,cdecrule(12,:,14)')

figure
plot(k,cdecrule(13,:,14))
title('k,cdecrule(13,:,14)')

figure
plot(k,cdecrule(14,:,14))
title('k,cdecrule(14,:,14)')

figure
plot(k,cdecrule(15,:,14))
title('k,cdecrule(15,:,14)')

figure
plot(k,cdecrule(15,:,14))
title('k,cdecrule(15,:,14)')

figure
plot(k,cdecrule(16,:,14))
title('k,cdecrule(16,:,14)')

figure
plot(k,cdecrule(17,:,14))
title('k,cdecrule(17,:,14)')
figure
plot(k,cdecrule(18,:,14))
title('k,cdecrule(18,:,14)')
figure
plot(k,cdecrule(19,:,14))
title('k,cdecrule(19,:,14)')
figure
plot(k,cdecrule(20,:,14))
title('k,cdecrule(20,:,14)')
figure
plot(k,cdecrule(21,:,14))
title('k,cdecrule(21,:,14)')
figure
plot(k,cdecrule(22,:,14))
title('k,cdecrule(22,:,14)')
figure
plot(k,cdecrule(23,:,14))
title('k,cdecrule(23,:,14)')
figure
plot(k,cdecrule(24,:,14))
title('k,cdecrule(24,:,14)')
figure
plot(k,cdecrule(25,:,14))
title('k,cdecrule(25,:,14)')
figure
plot(k,cdecrule(26,:,14))
title('k,cdecrule(26,:,14)')
```

```
figure
plot(k,cdecrule(27,:,14))
title('k,cdecrule(27,:,14)')
```

```
figure
plot(r,cdecrule(14,:,1))
title('r,cdecrule(14,:,1)')


figure
plot(r,cdecrule(14,:,2))
title('r,cdecrule(14,:,2)')


figure
plot(r,cdecrule(14,:,3))
title('r,cdecrule(14,:,3)')


figure
plot(r,cdecrule(14,:,4))
title('r,cdecrule(14,:,4)')


figure
plot(r,cdecrule(14,:,5))
title('r,cdecrule(14,:,5)')


figure
plot(r,cdecrule(14,:,6))
title('r,cdecrule(14,:,6)')


figure
plot(r,cdecrule(14,:,7))
title('r,cdecrule(14,:,7)')


figure
plot(r,cdecrule(14,:,8))
title('r,cdecrule(14,:,8)')

figure
plot(r,cdecrule(14,:,9))
title('r,cdecrule(14,:,9)')

figure
plot(r,cdecrule(14,:,10))
title('r,cdecrule(14,:,10)')
figure
plot(r,cdecrule(14,:,11))
title('r,cdecrule(14,:,11)')
figure
plot(r,cdecrule(14,:,12))
title('r,cdecrule(14,:,12)')
figure
```

```
plot(r,cdecrule(14,:,13))
title('r,cdecrule(14,:,13)')
figure
plot(r,cdecrule(14,:,14))
title('r,cdecrule(14,:,14)')
figure
plot(r,cdecrule(14,:,15))
title('r,cdecrule(14,:,15)')
figure
plot(r,cdecrule(14,:,16))
title('r,cdecrule(14,:,16)')
figure
plot(r,cdecrule(14,:,17))
title('r,cdecrule(14,:,17)')
figure
plot(r,cdecrule(14,:,18))
title('r,cdecrule(14,:,18)')
figure
plot(r,cdecrule(14,:,19))
title('r,cdecrule(14,:,19)')
figure
plot(r,cdecrule(14,:,20))
title('r,cdecrule(14,:,20)')
figure
plot(r,cdecrule(14,:,21))
title('r,cdecrule(14,:,21)')
figure
plot(r,cdecrule(14,:,22))
title('r,cdecrule(14,:,22)')
figure
plot(r,cdecrule(14,:,23))
title('r,cdecrule(14,:,23)')
figure
plot(r,cdecrule(14,:,24))
title('r,cdecrule(14,:,24)')
figure
plot(r,cdecrule(14,:,25))
title('r,cdecrule(14,:,25)')
figure
plot(r,cdecrule(14,:,26))
title('r,cdecrule(14,:,26)')
figure
plot(r,cdecrule(14,:,27))
title('r,cdecrule(14,:,27)')
```

```
figure
plot(r,cdecrule(1,:,14))
title('r,cdecrule(1,:,14)')


figure
plot(r,cdecrule(2,:,14))
title('r,cdecrule(2,:,14)')


figure
plot(r,cdecrule(3,:,14))
title('r,cdecrule(3,:,14)')
```

```
figure
plot(r,cdecrule(4,:,14))
title('r,cdecrule(4,:,14)')

figure
plot(r,cdecrule(5,:,14))
title('r,cdecrule(5,:,14)')

figure
plot(r,cdecrule(6,:,14))
title('r,cdecrule(6,:,14)')

figure
plot(r,cdecrule(7,:,14))
title('r,cdecrule(7,:,14)')

figure
plot(r,cdecrule(8,:,14))
title('r,cdecrule(8,:,14)')

figure
plot(r,cdecrule(9,:,14))
title('r,cdecrule(9,:,14)')



figure
plot(r,cdecrule(10,:,14))
title('r,cdecrule(10,:,14)')



figure
plot(r,cdecrule(11,:,14))
title('r,cdecrule(11,:,14)')


figure
plot(r,cdecrule(12,:,14))
title('r,cdecrule(12,:,14)')

figure
plot(r,cdecrule(13,:,14))
title('r,cdecrule(13,:,14)')

figure
plot(r,cdecrule(14,:,14))
title('r,cdecrule(14,:,14)')

figure
plot(r,cdecrule(15,:,14))
title('r,cdecrule(15,:,14)')

figure
plot(r,cdecrule(15,:,14))
title('r,cdecrule(15,:,14)')

figure
```

```
plot(r,cdecrule(16,:,14))
title('r,cdecrule(16,:,14)')

figure
plot(r,cdecrule(17,:,14))
title('r,cdecrule(17,:,14)')
figure
plot(r,cdecrule(18,:,14))
title('r,cdecrule(18,:,14)')
figure
plot(r,cdecrule(19,:,14))
title('r,cdecrule(19,:,14)')
figure
plot(r,cdecrule(20,:,14))
title('r,cdecrule(20,:,14)')
figure
plot(r,cdecrule(21,:,14))
title('r,cdecrule(21,:,14)')
figure
plot(k,cdecrule(22,:,14))
title('r,cdecrule(22,:,14)')
figure
plot(r,cdecrule(23,:,14))
title('r,cdecrule(23,:,14)')
figure
plot(r,cdecrule(24,:,14))
title('r,cdecrule(24,:,14)')
figure
plot(r,cdecrule(25,:,14))
title('r,cdecrule(25,:,14)')
figure
plot(r,cdecrule(26,:,14))
title('r,cdecrule(26,:,14)')
figure
plot(r,cdecrule(27,:,14))
title('r,cdecrule(27,:,14)')
```

```
plot(k,k,k,kdecrule(14,:,1))
title('k,k,k,kdecrule(14,:,1)')

plot(k,k,k,kdecrule(14,:,2))
title('k,k,k,kdecrule(14,:,2)')

figure
plot(k,k,k,kdecrule(14,:,3))
title('k,k,k,kdecrule(14,:,3)')

figure
plot(k,k,k,kdecrule(14,:,4))
title('k,k,k,kdecrule(14,:,4)')

figure
plot(k,k,k,kdecrule(14,:,5))
title('k,k,k,kdecrule(14,:,5)')

figure
plot(k,k,k,kdecrule(14,:,6))
title('k,k,k,kdecrule(14,:,6)')

figure
```

```
plot(k,k,k,kdecrule(14,:,7))
title('k,k,k,kdecrule(14,:,7)')

figure
plot(k,k,k,kdecrule(14,:,8))
title('k,k,k,kdecrule(14,:,8)')

figure
plot(k,k,k,kdecrule(14,:,9))
title('k,k,k,kdecrule(14,:,9)')

figure
plot(k,k,k,kdecrule(14,:,10))
title('k,k,k,kdecrule(14,:,10)')
figure
plot(k,k,k,kdecrule(14,:,11))
title('k,k,k,kdecrule(14,:,11)')
figure
plot(k,k,k,kdecrule(14,:,12))
title('k,k,k,kdecrule(14,:,12)')
figure
plot(k,k,k,kdecrule(14,:,13))
title('k,k,k,kdecrule(14,:,13)')
figure
plot(k,k,k,kdecrule(14,:,14))
title('k,k,k,kdecrule(14,:,14)')
figure
plot(k,k,k,kdecrule(14,:,15))
title('k,k,k,kdecrule(14,:,15)')
figure
plot(k,k,k,kdecrule(14,:,16))
title('k,k,k,kdecrule(14,:,16)')
figure
plot(k,k,k,kdecrule(14,:,17))
title('k,k,k,kdecrule(14,:,17)')
figure
plot(k,k,k,kdecrule(14,:,18))
title('k,k,k,kdecrule(14,:,18)')
figure
plot(k,k,k,kdecrule(14,:,19))
title('k,k,k,kdecrule(14,:,19)')
figure
plot(k,k,k,kdecrule(14,:,20))
title('k,k,k,kdecrule(14,:,20)')
figure
plot(k,k,k,kdecrule(14,:,21))
title('k,k,k,kdecrule(14,:,21)')
figure
plot(k,k,k,kdecrule(14,:,22))
title('k,k,k,kdecrule(14,:,22)')
figure
plot(k,k,k,kdecrule(14,:,23))
title('k,k,k,kdecrule(14,:,23)')

figure
plot(k,k,k,kdecrule(14,:,24))
title('k,k,k,kdecrule(14,:,24)')
figure
plot(k,k,k,kdecrule(14,:,25))
title('k,k,k,kdecrule(14,:,25)')
figure
```

```
plot(k,k,k,kdecrule(14,:,26))
title('k,k,k,kdecrule(14,:,26)')
figure
plot(k,k,k,kdecrule(14,:,27))
title('k,k,k,kdecrule(14,:,27)')
```

```
plot(k,k,k,kdecrule(1,:,14))
title('k,k,k,kdecrule(1,:,14)')

figure
plot(k,k,k,kdecrule(2,:,14))
title('k,k,k,kdecrule(2,:,14)')

figure
plot(k,k,k,kdecrule(3,:,14))
title('k,k,k,kdecrule(3,:,14)')

figure
plot(k,k,k,kdecrule(4,:,14))
title('k,k,k,kdecrule(4,:,14)')

figure
plot(k,k,k,kdecrule(5,:,14))
title('k,k,k,kdecrule(5,:,14)')

figure
plot(k,k,k,kdecrule(6,:,14))
title('k,k,k,kdecrule(6,:,14)')

figure
plot(k,k,k,kdecrule(7,:,14))
title('k,k,k,kdecrule(7,:,14)')

figure
plot(k,k,k,kdecrule(8,:,14))
title('k,k,k,kdecrule(8,:,14)')

figure
plot(k,k,k,kdecrule(9,:,14))
title('k,k,k,kdecrule(9,:,14)')

figure
plot(k,k,k,kdecrule(10,:,14))
title('k,k,k,kdecrule(10,:,14)')

figure
plot(k,k,k,kdecrule(11,:,14))
title('k,k,k,kdecrule(11,:,14)')

figure
plot(k,k,k,kdecrule(12,:,14))
title('k,k,k,kdecrule(12,:,14)')

figure
plot(k,k,k,kdecrule(13,:,14))
title('k,k,k,kdecrule(13,:,14)')
```

```
figure
plot(k,k,k,kdecrule(14,:,14))
title('k,k,k,kdecrule(14,:,14)')

figure
plot(k,k,k,kdecrule(15,:,14))
title('k,k,k,kdecrule(15,:,14)')

figure
plot(k,k,k,kdecrule(16,:,14))
title('k,k,k,kdecrule(16,:,14)')

figure
plot(k,k,k,kdecrule(17,:,14))
title('k,k,k,kdecrule(17,:,14)')


figure
plot(k,k,k,kdecrule(18,:,14))
title('k,k,k,kdecrule(18,:,14)')

figure
plot(k,k,k,kdecrule(19,:,14))
title('k,k,k,kdecrule(19,:,14)')
figure
plot(k,k,k,kdecrule(20,:,14))
title('k,k,k,kdecrule(20,:,14)')
figure
plot(k,k,k,kdecrule(21,:,14))
title('k,k,k,kdecrule(21,:,14)')
figure
plot(k,k,k,kdecrule(22,:,14))
title('k,k,k,kdecrule(22,:,14)')
figure
plot(k,k,k,kdecrule(23,:,14))
title('k,k,k,kdecrule(23,:,14)')
figure
plot(k,k,k,kdecrule(24,:,14))
title('k,k,k,kdecrule(24,:,14)')
figure
plot(k,k,k,kdecrule(25,:,14))
title('k,k,k,kdecrule(25,:,14)')
figure
plot(k,k,k,kdecrule(26,:,14))
title('k,k,k,kdecrule(26,:,14)')
figure
plot(k,k,k,kdecrule(27,:,14))
title('k,k,k,kdecrule(27,:,14)')
```

```
figure
plot(r,kdecrule(14,:,1))
title('r,kdecrule(14,:,1)')


figure
```

```
plot(r,kdecrule(14,:,2))
title('r,kdecrule(14,:,2)')


figure
plot(r,kdecrule(14,:,3))
title('r,kdecrule(14,:,3)')


figure
plot(r,kdecrule(14,:,4))
title('r,kdecrule(14,:,4)')


figure
plot(r,kdecrule(14,:,5))
title('r,kdecrule(14,:,5)')


figure
plot(r,kdecrule(14,:,6))
title('r,kdecrule(14,:,6)')


figure
plot(r,kdecrule(14,:,7))
title('r,kdecrule(14,:,7)')


figure
plot(r,kdecrule(14,:,8))
title('r,kdecrule(14,:,8)')

figure
plot(r,kdecrule(14,:,9))
title('r,kdecrule(14,:,9)')

figure
plot(r,kdecrule(14,:,10))
title('r,kdecrule(14,:,10)')
figure
plot(r,kdecrule(14,:,11))
title('r,kdecrule(14,:,11)')
figure
plot(r,kdecrule(14,:,12))
title('r,kdecrule(14,:,12)')
figure
plot(r,kdecrule(14,:,13))
title('r,kdecrule(14,:,13)')
figure
plot(r,kdecrule(14,:,14))
title('r,kdecrule(14,:,14)')
figure
plot(r,kdecrule(14,:,15))
title('r,kdecrule(14,:,15)')
figure
plot(r,kdecrule(14,:,16))
title('r,kdecrule(14,:,16)')
figure
```

```
plot(r,kdecrule(14,:,17))
title('r,kdecrule(14,:,17)')
figure
plot(r,kdecrule(14,:,18))
title('r,kdecrule(14,:,18)')
figure
plot(r,kdecrule(14,:,19))
title('r,kdecrule(14,:,19)')
figure
plot(r,kdecrule(14,:,20))
title('r,kdecrule(14,:,20)')
figure
plot(r,kdecrule(14,:,21))
title('r,kdecrule(14,:,21)')
figure
plot(r,kdecrule(14,:,22))
title('r,kdecrule(14,:,22)')
figure
plot(r,kdecrule(14,:,23))
title('r,kdecrule(14,:,23)')
figure
plot(r,kdecrule(14,:,24))
title('r,kdecrule(14,:,24)')
figure
plot(r,kdecrule(14,:,25))
title('r,kdecrule(14,:,25)')
figure
plot(r,kdecrule(14,:,26))
title('r,kdecrule(14,:,26)')
figure
plot(r,kdecrule(14,:,27))
title('r,kdecrule(14,:,27)')
```

```
figure
plot(r,kdecrule(1,:,14))
title('r,kdecrule(1,:,14)')


figure
plot(r,kdecrule(2,:,14))
title('r,kdecrule(2,:,14)')


figure
plot(r,kdecrule(3,:,14))
title('r,kdecrule(3,:,14)')

figure
plot(r,kdecrule(4,:,14))
title('r,kdecrule(4,:,14)')

figure
plot(r,kdecrule(5,:,14))
title('r,kdecrule(5,:,14)')

figure
plot(r,kdecrule(6,:,14))
title('r,kdecrule(6,:,14)')
```

```
figure
plot(r,kdecrule(7,:,14))
title('r,kdecrule(7,:,14)')

figure
plot(r,kdecrule(8,:,14))
title('r,kdecrule(8,:,14)')

figure
plot(r,kdecrule(9,:,14))
title('r,kdecrule(9,:,14)')


figure
plot(r,kdecrule(10,:,14))
title('r,kdecrule(10,:,14)')


figure
plot(r,kdecrule(11,:,14))
title('r,kdecrule(11,:,14)')


figure
plot(r,kdecrule(12,:,14))
title('r,kdecrule(12,:,14)')
 figure
plot(r,kdecrule(13,:,14))
title('r,kdecrule(13,:,14)')

figure
plot(r,kdecrule(14,:,14))
title('r,kdecrule(14,:,14)')

figure
plot(r,kdecrule(15,:,14))
title('r,kdecrule(15,:,14)')

figure
plot(r,kdecrule(15,:,14))
title('r,kdecrule(15,:,14)')

figure
plot(r,kdecrule(16,:,14))
title('r,kdecrule(16,:,14)')

figure
plot(r,kdecrule(17,:,14))
title('r,kdecrule(17,:,14)')
figure
plot(r,kdecrule(18,:,14))
title('r,kdecrule(18,:,14)')
figure
plot(r,kdecrule(19,:,14))
title('r,kdecrule(19,:,14)')
figure
plot(r,kdecrule(20,:,14))
title('r,kdecrule(20,:,14)')
figure
```

```
plot(r,cdecrule(21,:,14))
title('r,cdecrule(21,:,14)')
figure
plot(r,kdecrule(22,:,14))
title('r,kdecrule(22,:,14)')
figure
plot(r,kdecrule(23,:,14))
title('r,kdecrule(23,:,14)')
figure
plot(r,kdecrule(24,:,14))
title('r,kdecrule(24,:,14)')
figure
plot(r,kdecrule(25,:,14))
title('r,kdecrule(25,:,14)')
figure
plot(r,kdecrule(26,:,14))
title('r,kdecrule(26,:,14)')
figure
plot(r,kdecrule(27,:,14))
title('r,kdecrule(27,:,14)')
```

```
THE NEW DECISIONS RULES ( HANDLINGSREGELEN)

DERA=((adecrule1(14,14,:)-adecrule1(14,14,:)/1.04));

RO3=DERA./adecrule1(14,14,:); % dec.rule for the share gives 0.0385 ,  for
all the states



DERA4=((adecrule1(:,:,:)-adecrule1(:,:,:)/1.04)); % The general rule when
we ignore the maninland economy. Da
RO4=DERA4./adecrule1(:,:,:); % same value in all the states.


%New consumption Norway
cdecruleN=kstar^alpha-delta*kstar+RO4(:,:,14)*a(:); % The maninland economy
is constant
% the consumption rule only depends on oil
figure
plot(r,cdecruleN)% Da constante, o consumo nao influenciado pelo r.
xlabel('r_t')
ylabel('c_t')
title('consumption rule implied by the Norwegian Handlingsregelen')


% Only oil consumption Norway
Hr=RO4(:,:,14)*a(:);
figure
plot(r,Hr)
xlabel('r_t')
ylabel('Hr')
title(' The consumption of oil implied by The Norwegian Handlingsregelen')


% New consumption, Angola
cdecruleA=k(:).^alpha+(1-delta.*k(:))-kdecrule(:,14,14)+RO4(:,:,14)*a(:); %
Even without inclunding the capita...
```

```
% which we know it is sensibe to r. Fixed the asset dk rule for plotting
% purposes.
% Alterntively we can ignore dk rule, and check it agains r. its influenced
% aniway. It will actually not change the fluctuations c.

figure
plot(r,cdecruleA)  % O consumo sera influencaido pelo r é o resultado.
xlabel('r_t')
ylabel('c_t')
title('  consumption when Handlingsregelen is applied outside the steady
state ')
```

Appendix 2: The decision rules

Note on how to read the titles of the figures

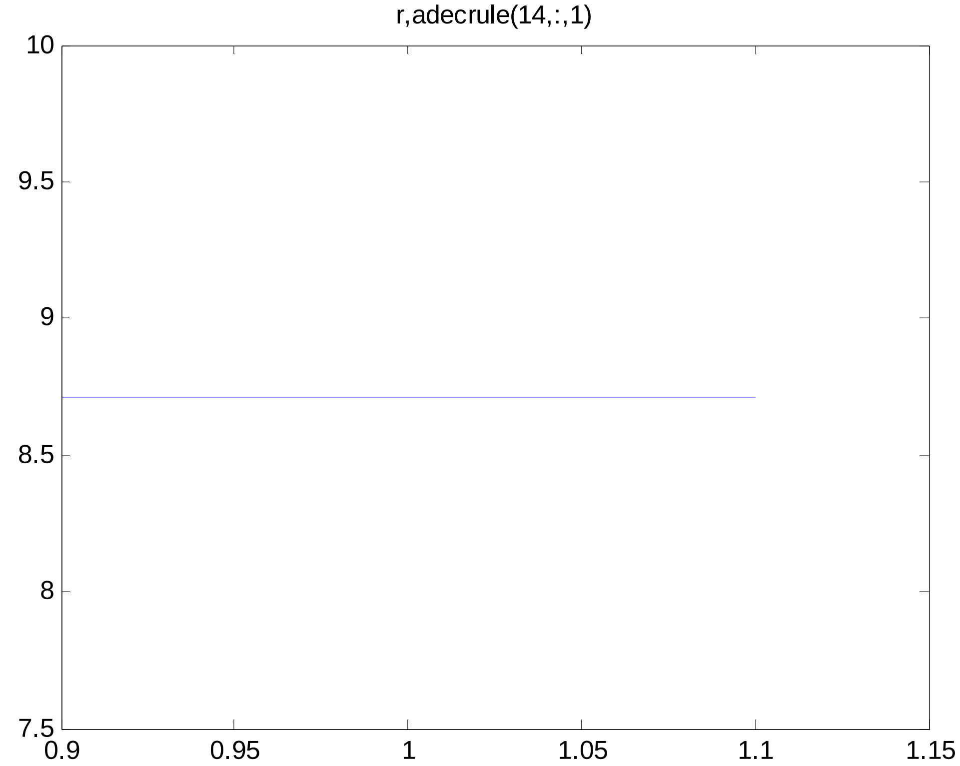
The title for each decision rule contains information of the variables and explains the content of the figure, in the following manner: adecrule is the decision is the decision rule for oil asset next period, cdecrule is the decision rule for consumption and kdecrule is the decision rule for capital. Each decision rule is a function of three state variables, the capital, the amount oil wealth and the rate of return on the international asset, in that order. The equilibrium values for capital and asset correspond to the grid number 14. For example the title “r, cdecrule (14,:, 3)” means that the decision rule for capital conditioned at capital being at steady state, when the asset varies freely and the rate of return on the asset is at its grid value number 3.

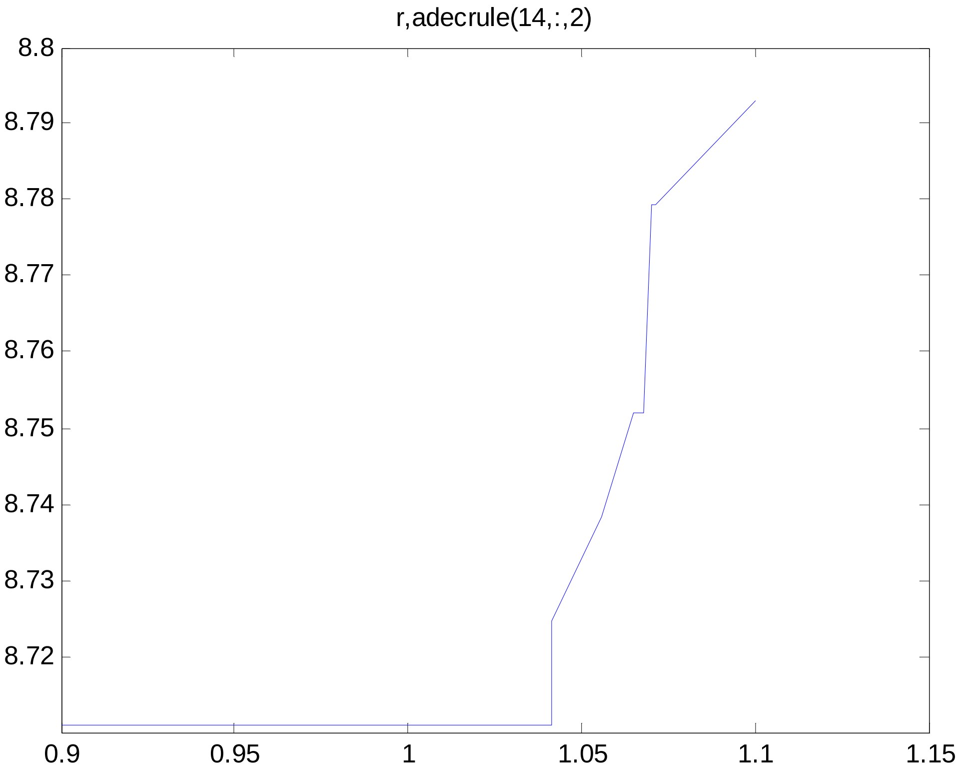
We divide the figures in 12 cases as demonstrated in table 1

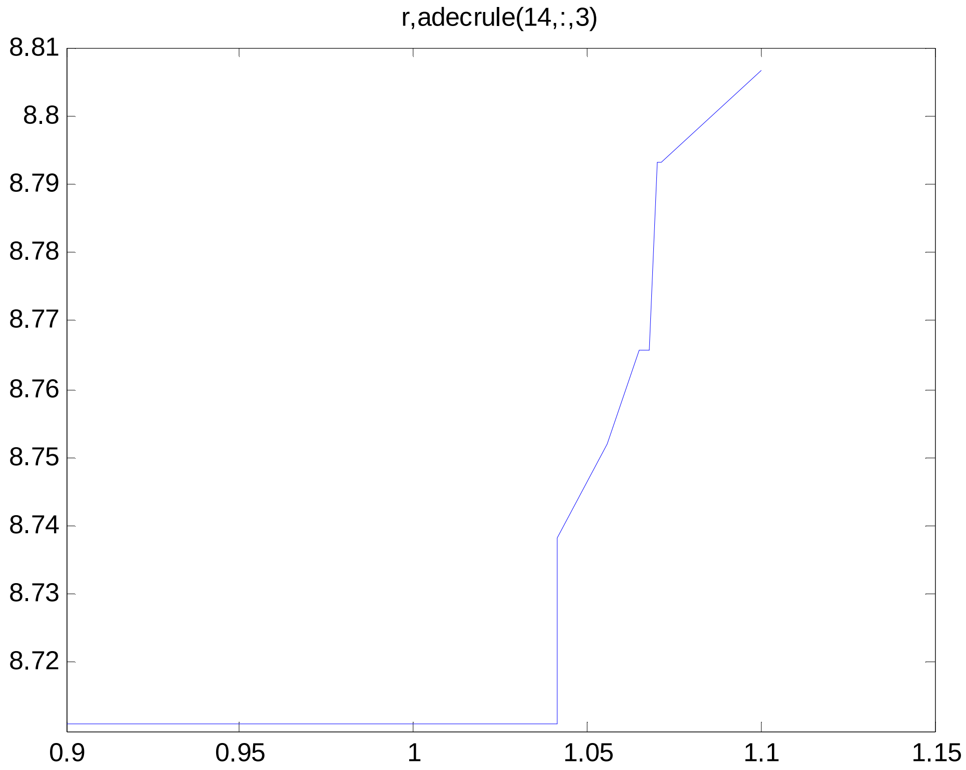
Table 1

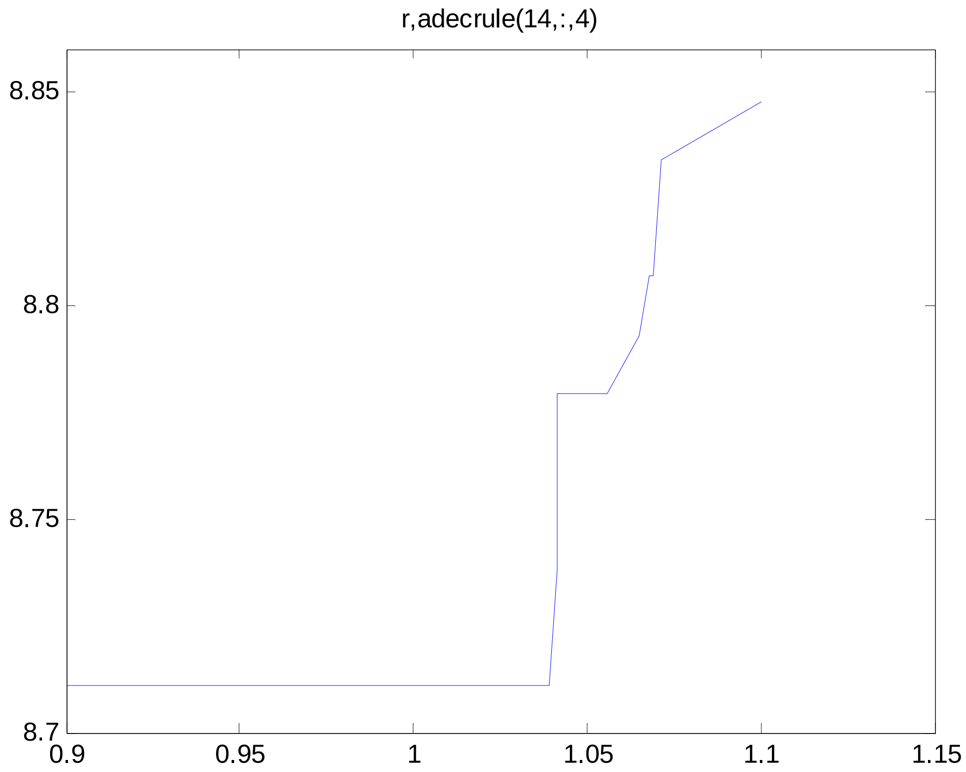
The decision rules in categories						
Case	Decision rule for	Fixed state variable	Free variable	The changing state variable	Plotted against	Pages
1	asset next	capital	asset	rate	rate	
2	asset next	rate	asset	capital	rate	
3	asset next	capital	asset	rate	capital	
4	asset next	rate	asset	capital	capital	
5	consumption	capital	asset	rate	capital	
6	consumption	rate	asset	capital	capital	
7	consumption	capital	asset	rate	rate	
8	consumption	rate	asset	capital	rate	
9	capital next	capital	asset	rate	capital	
10	capital next	rate	asset	capital	capital	
11	capital next	capital	asset	rate	rate	
12	capital next	rate	asset	capital	rate	

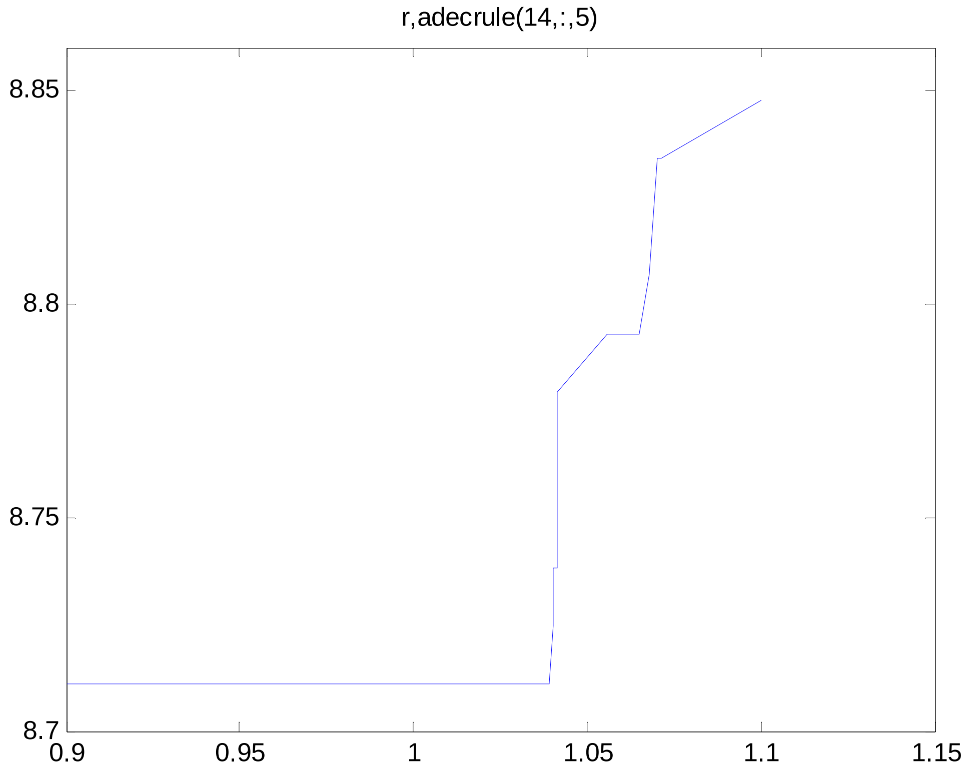
Case_1

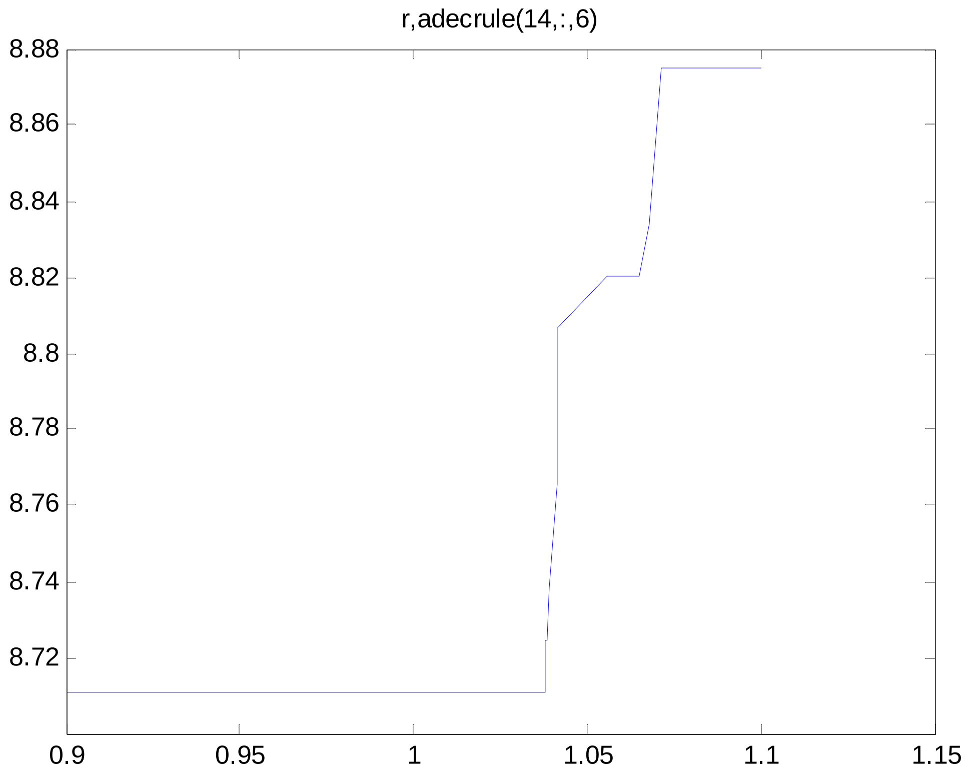

r,adecrule(14,:,1)
10
9.5
9
8.5
8
7.5
0.9
0.95
1
1.05
1.1
1.15

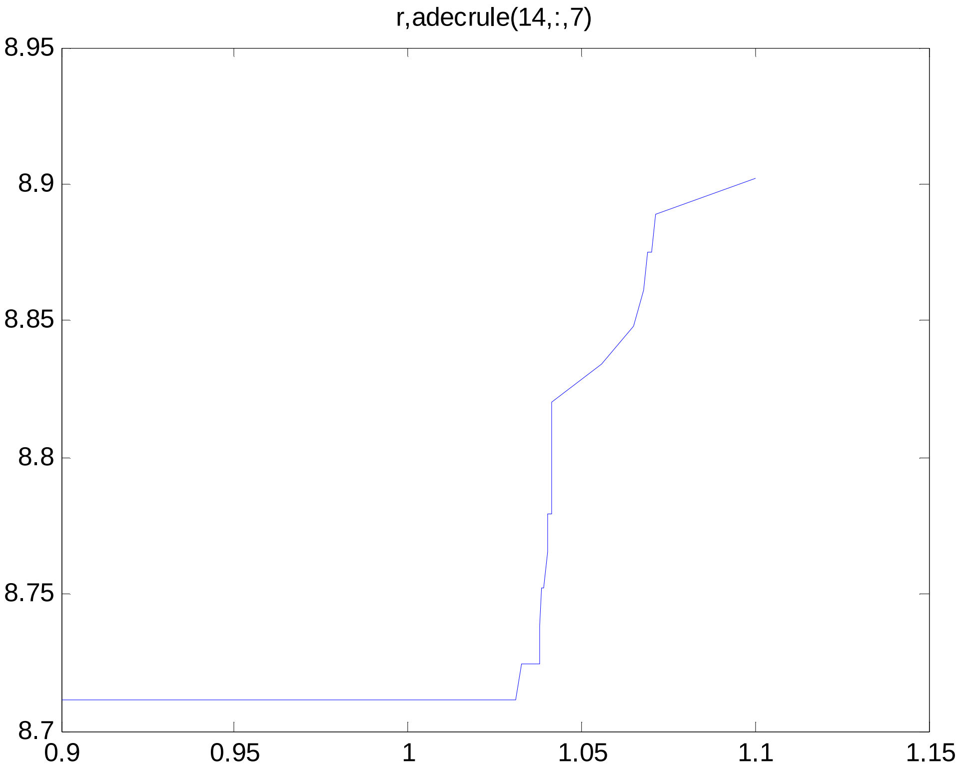

r,adecrule(14,:,2)
8.8
8.79
8.78
8.77
8.76
8.75
8.74
8.73
8.72
0.9
0.95
1
1.05
1.1
1.15

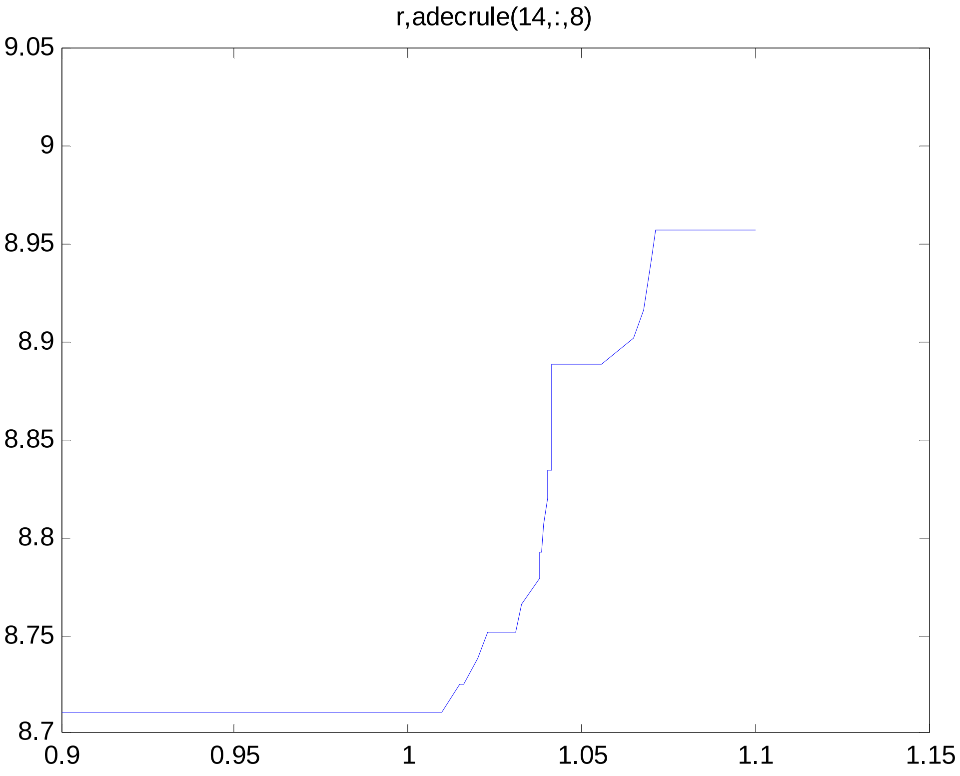

r,adecrule(14,:,3)
8.81
8.8
8.79
8.78
8.77
8.76
8.75
8.74
8.73
8.72
0.9
0.95
1
1.05
1.1
1.15

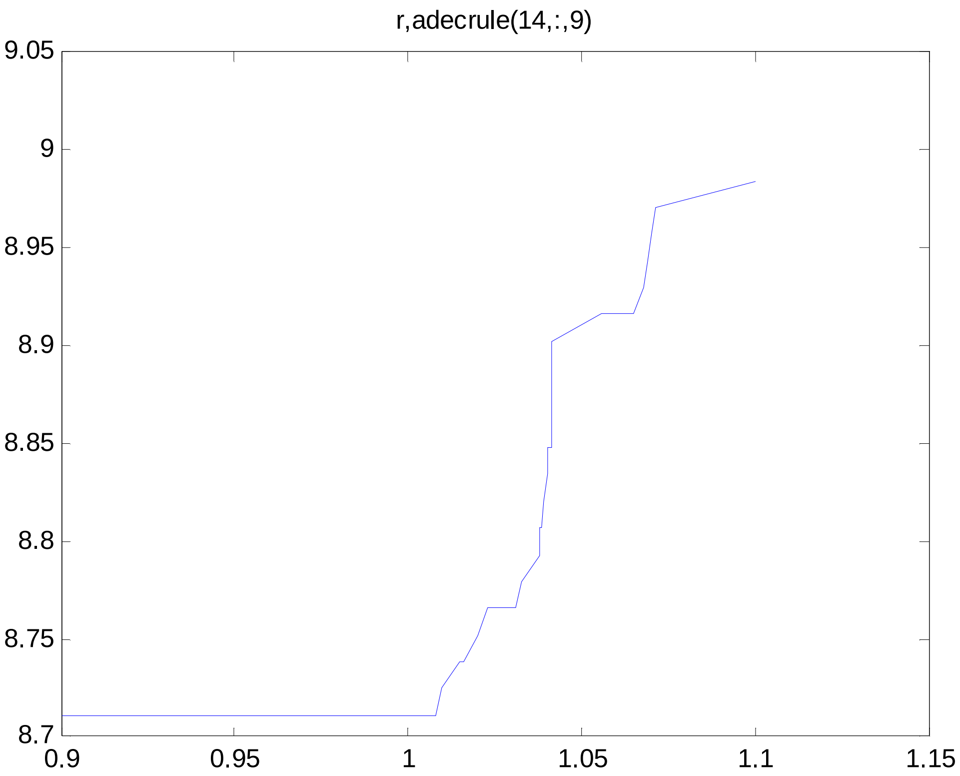

r,adecrule(14,:,4)
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

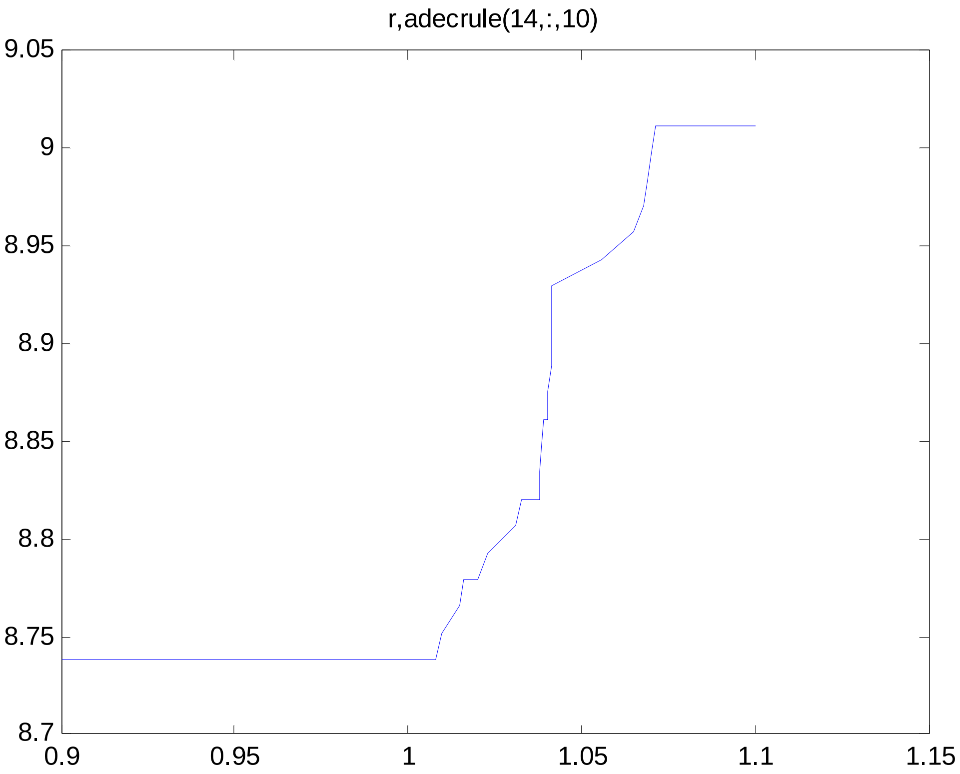

r,adecrule(14,:,5)
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

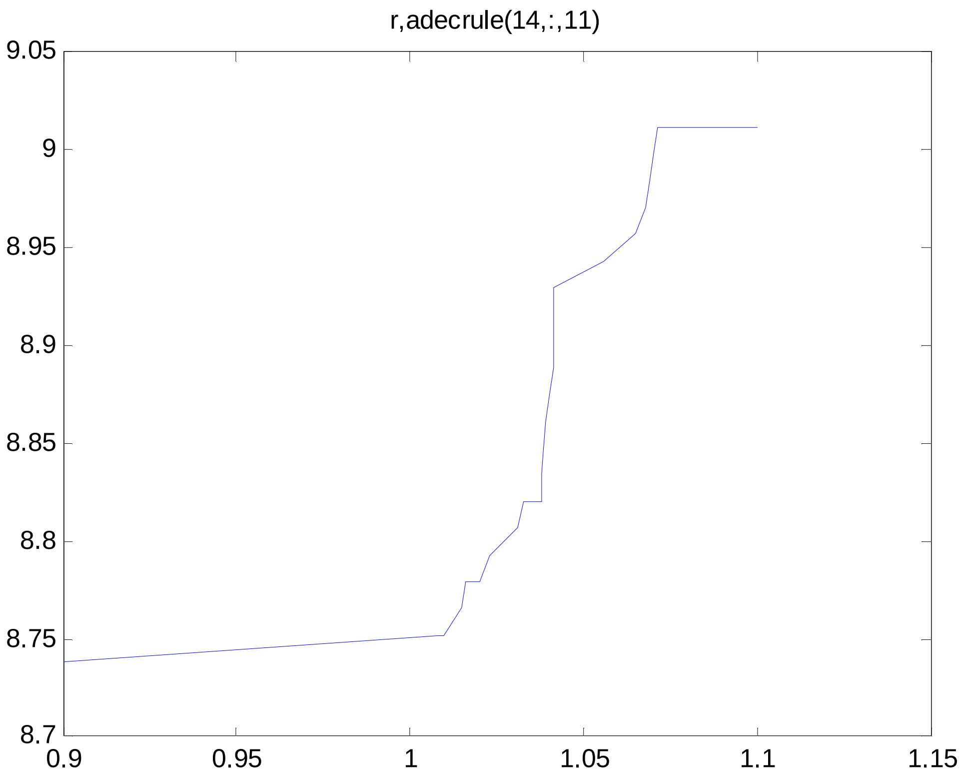

r,adecrule(14,:,6)
8.88
8.86
8.84
8.82
8.8
8.78
8.76
8.74
8.72
0.9
0.95
1
1.05
1.1
1.15

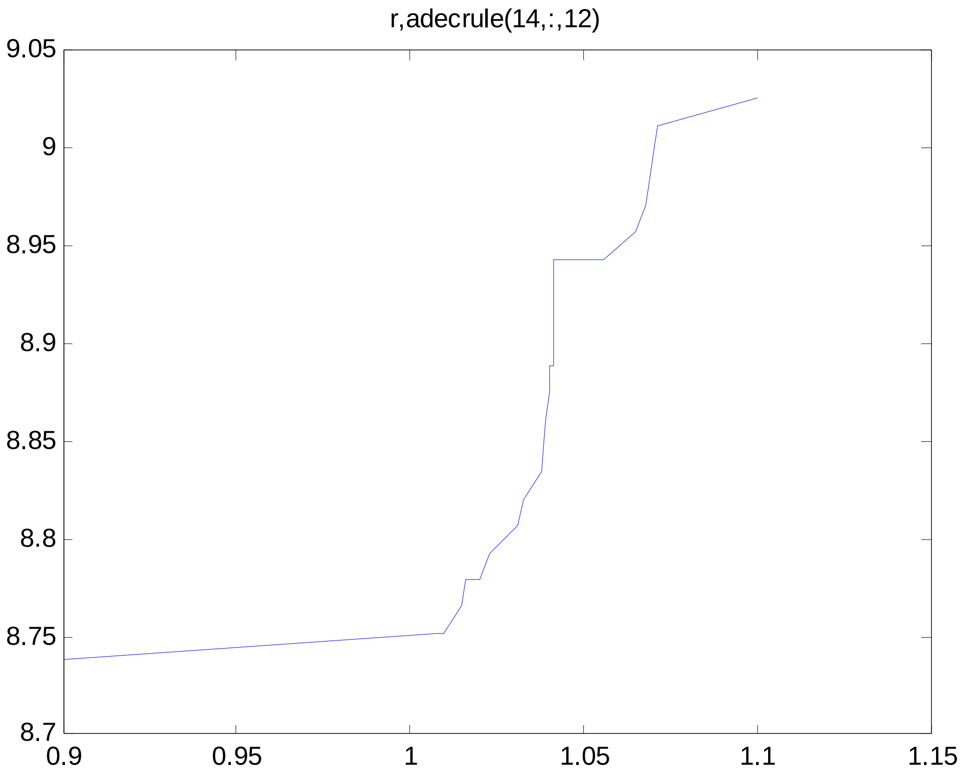

r,adecrule(14,:,7)
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

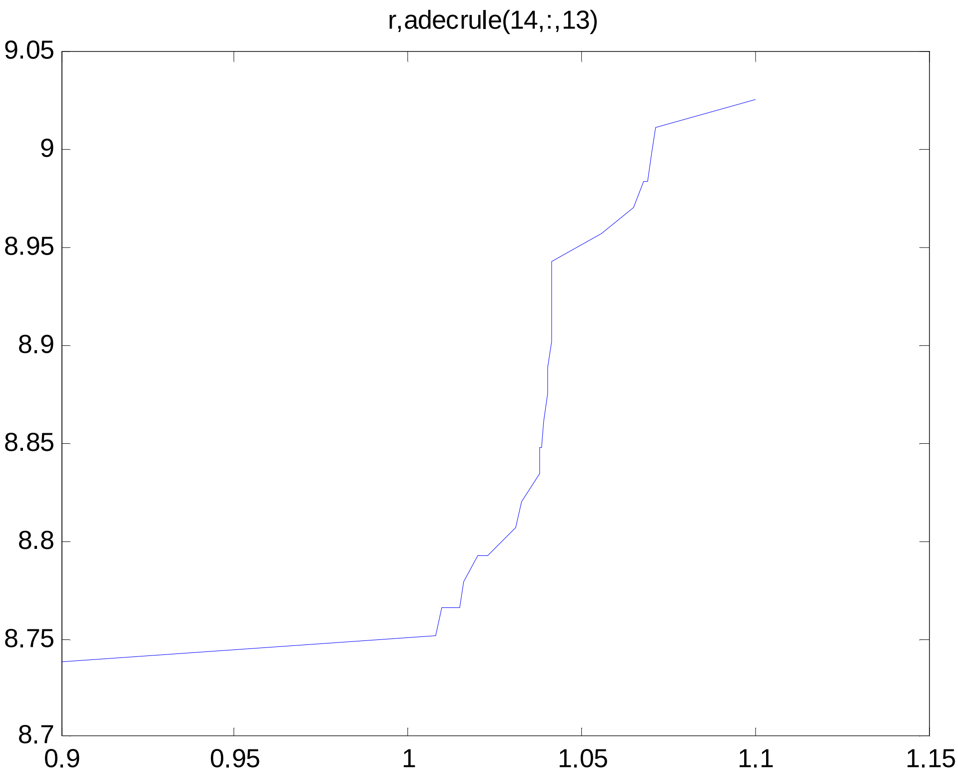

r,adecrule(14,:,8)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

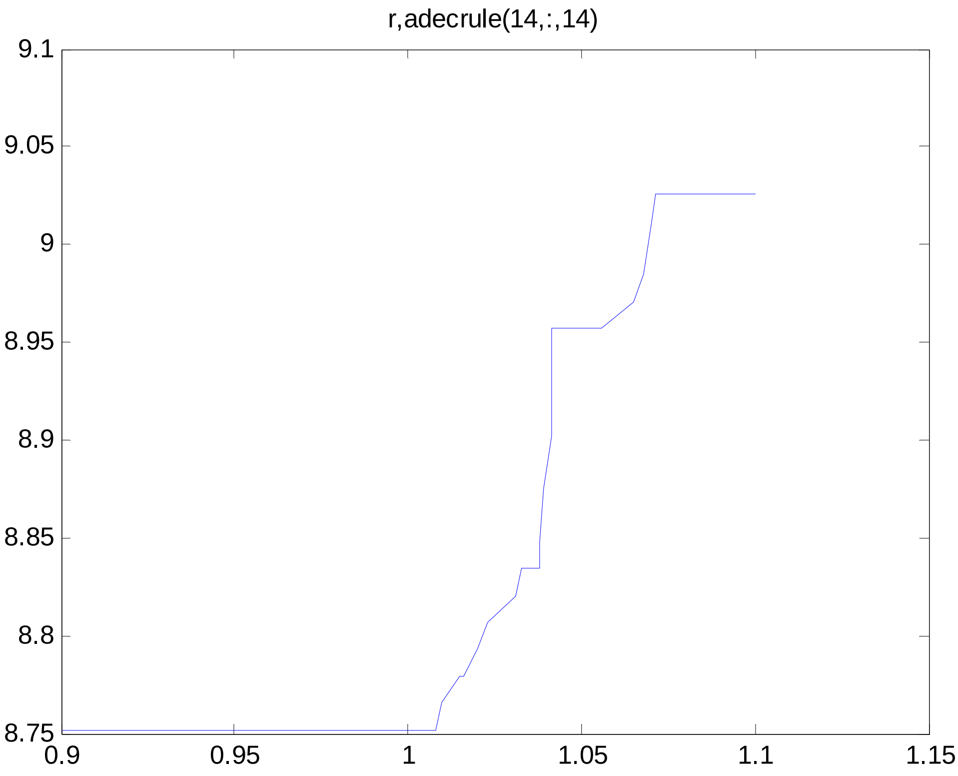

r,adecrule(14,:,9)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

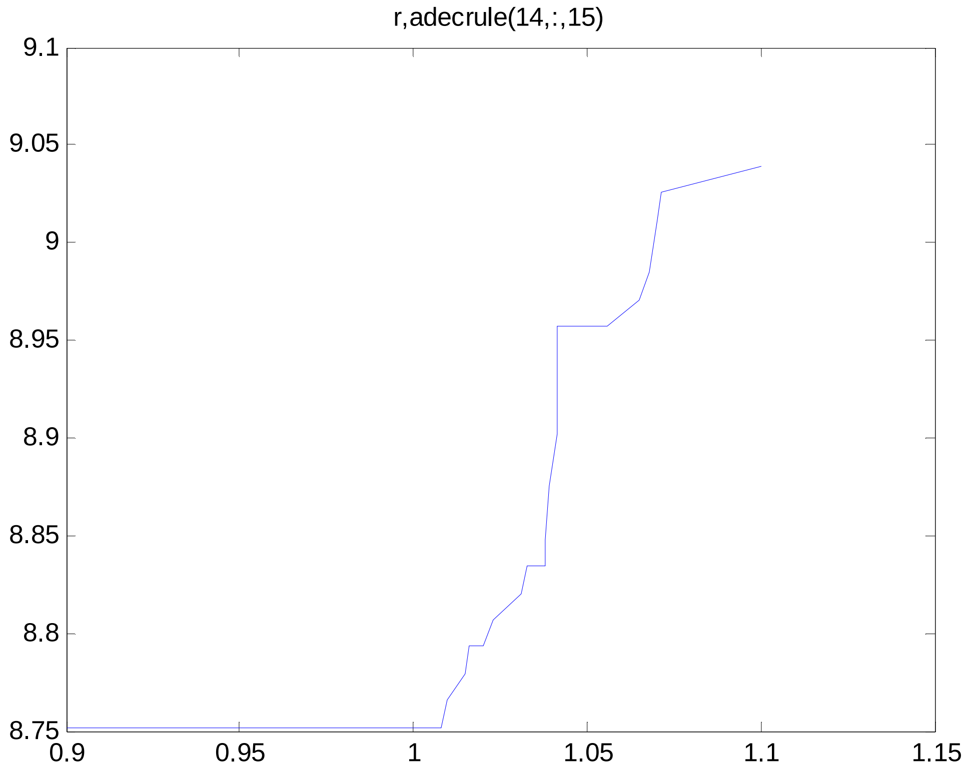

r,adecrule(14,:,10)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

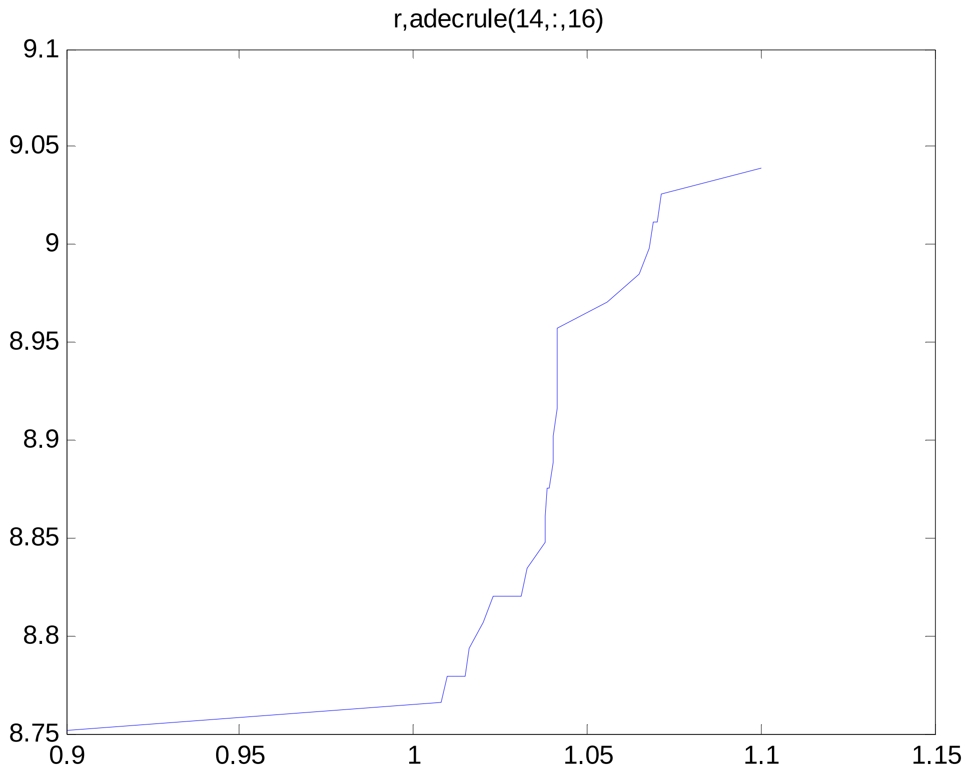

r,adecrule(14,:,11)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

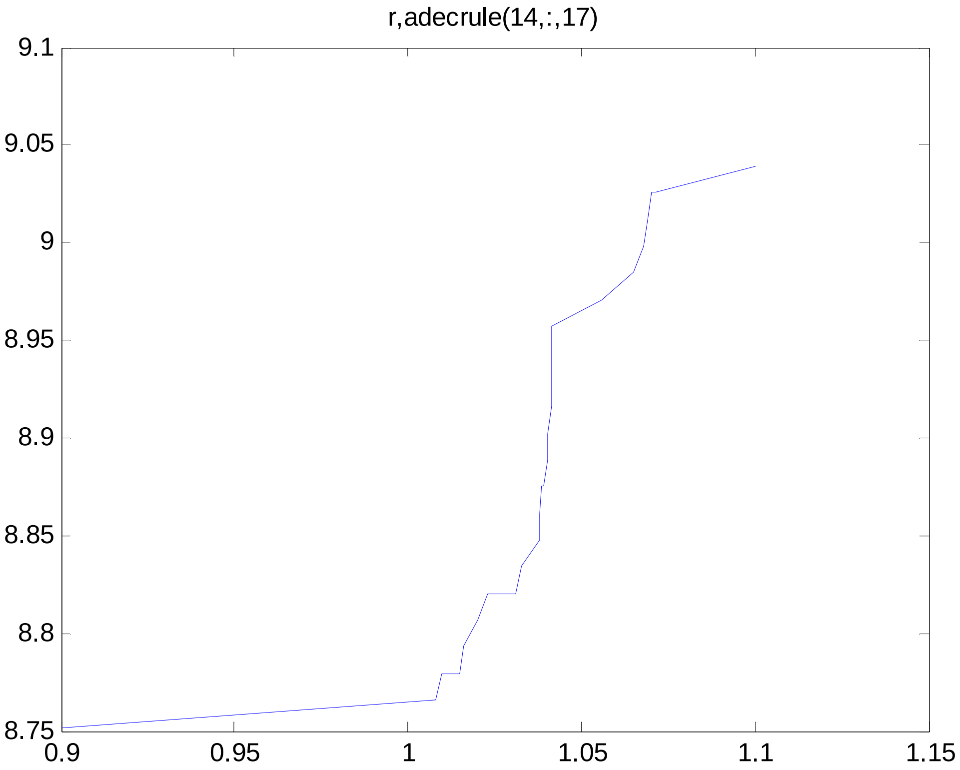

r,adecrule(14,:,12)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

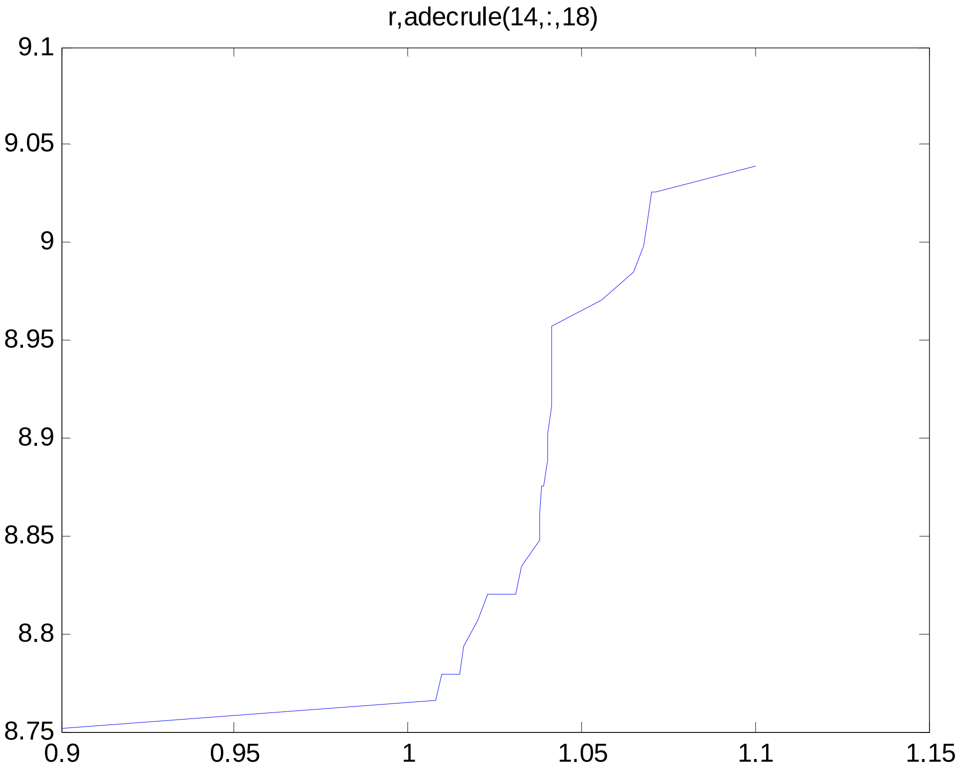

r,adecrule(14,:,13)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

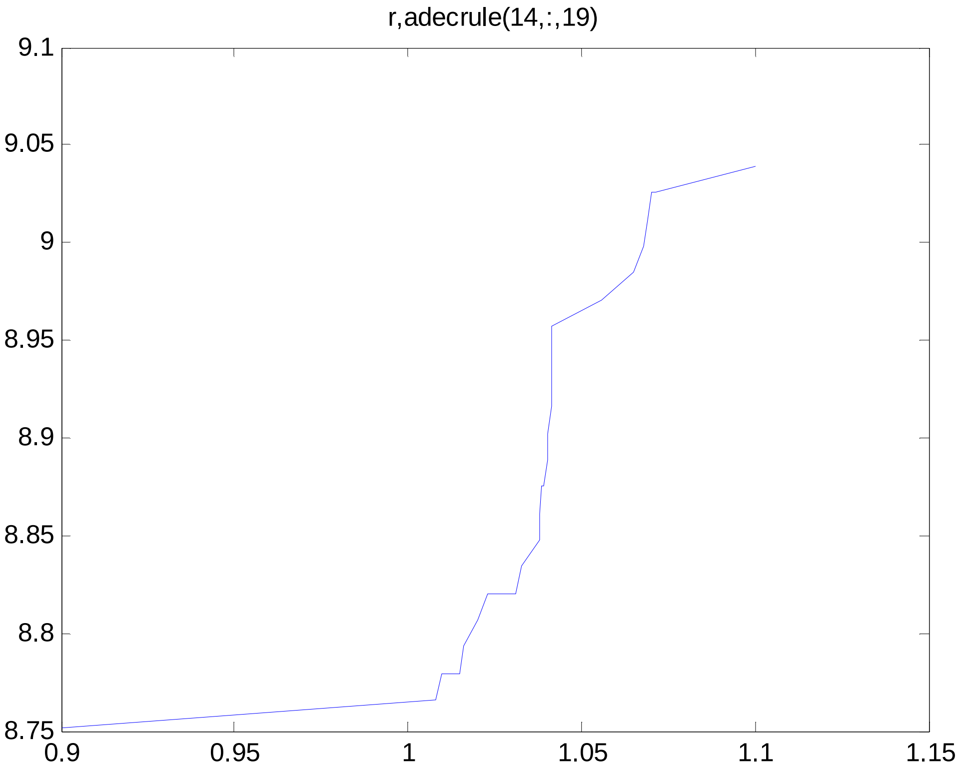

r,adecrule(14,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

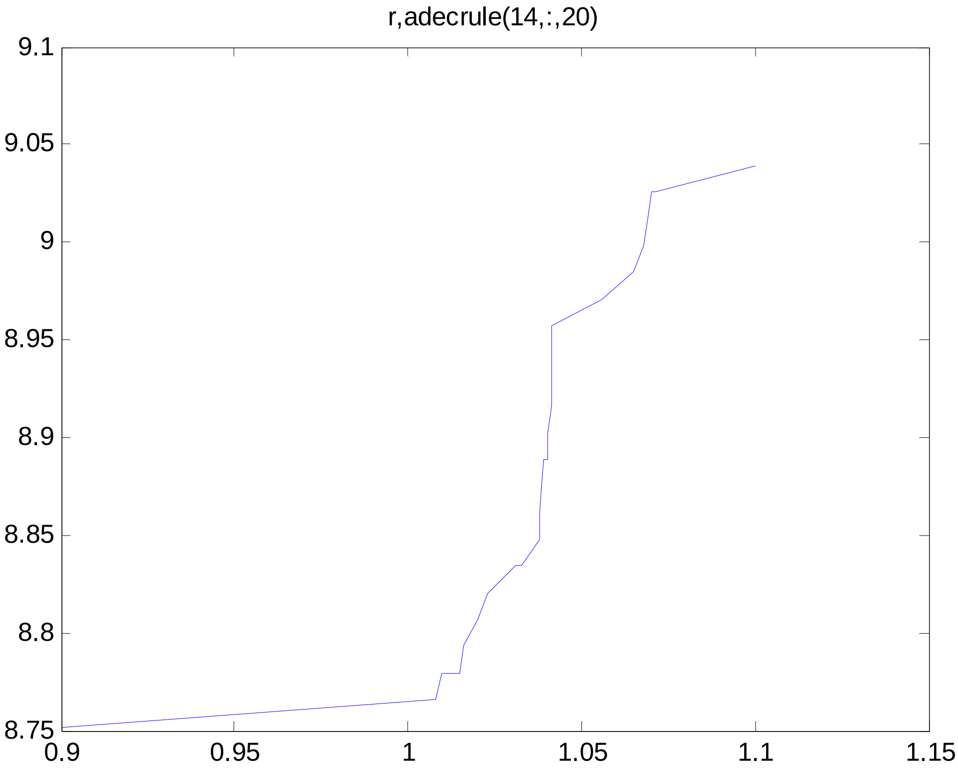

r,adecrule(14,:,15)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

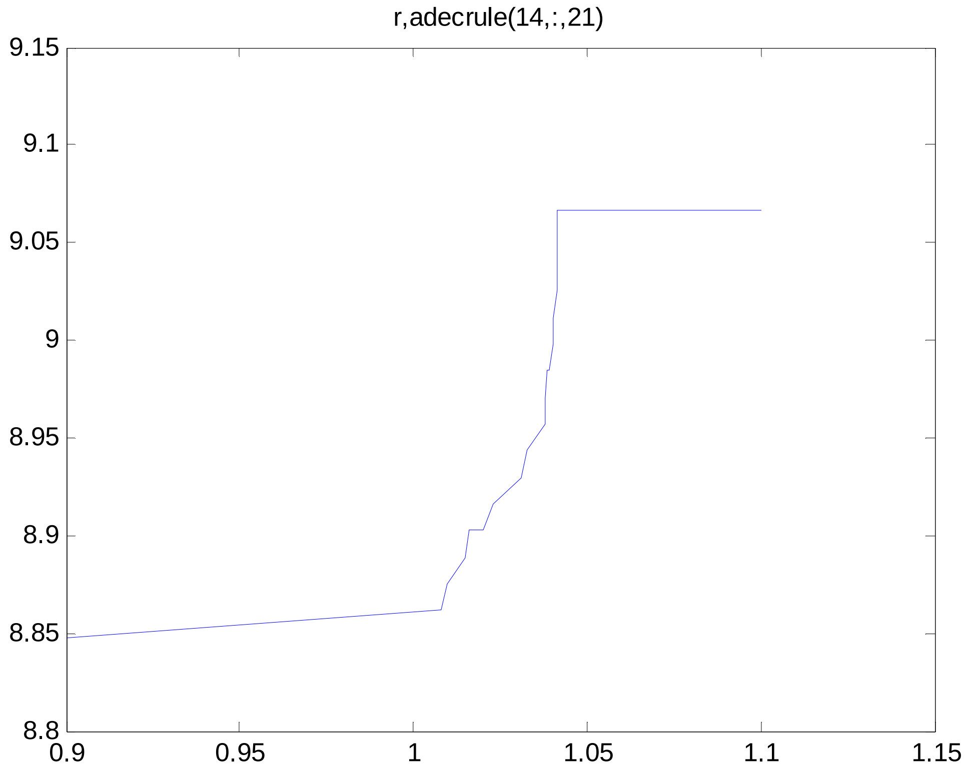

r,adecrule(14,:,16)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

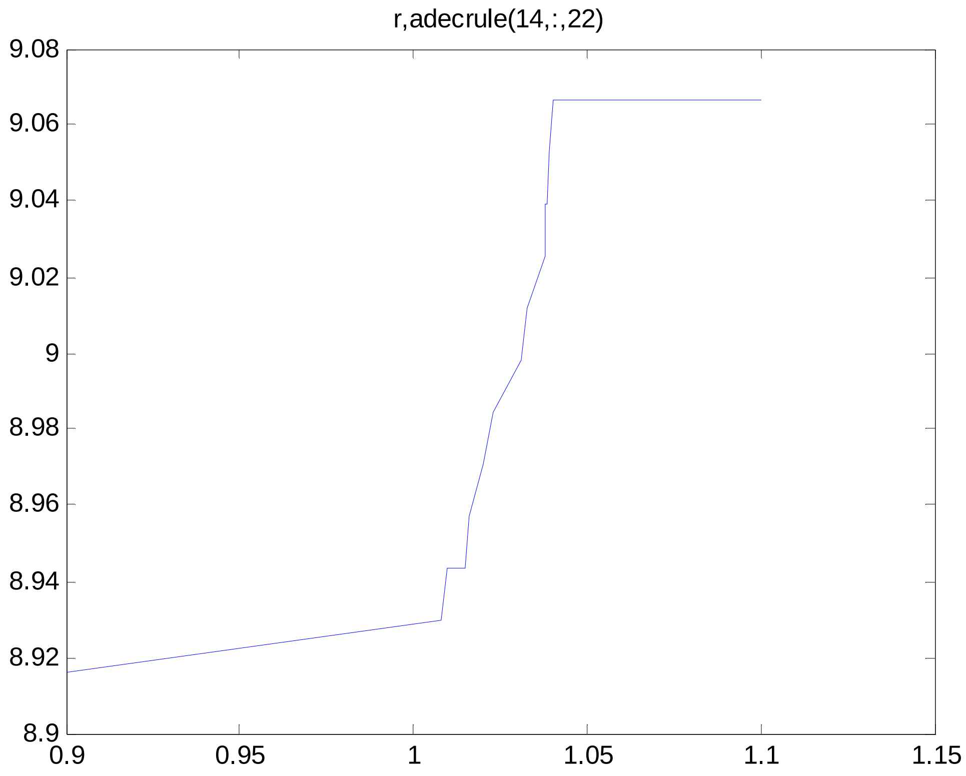

r,adecrule(14,:,17)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

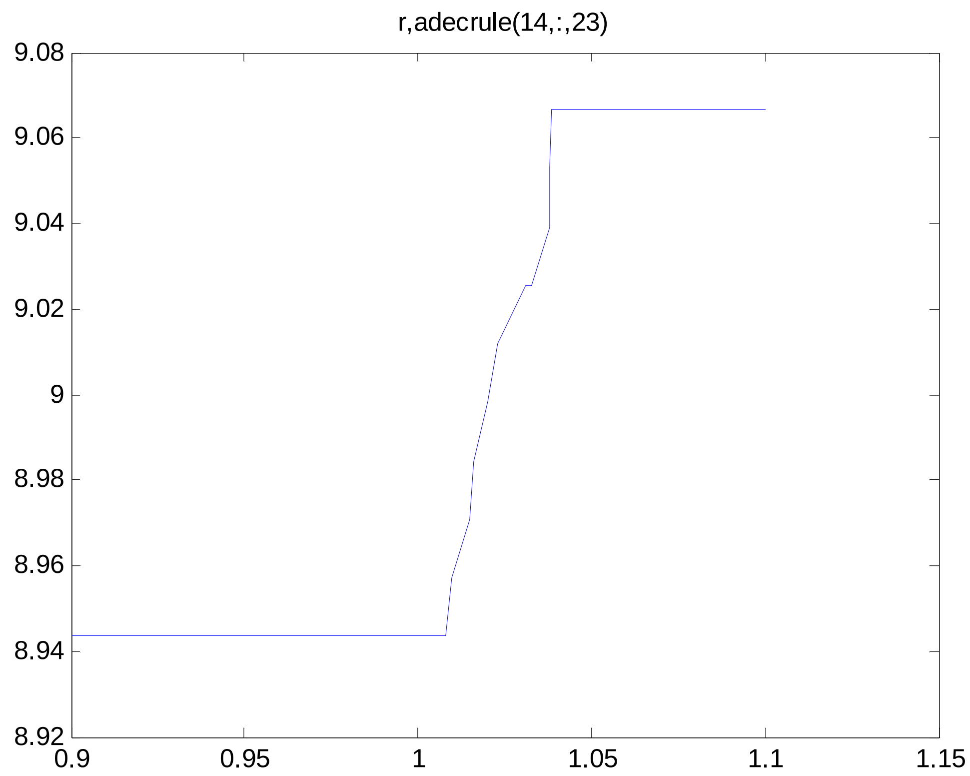

r,adecrule(14,:,18)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

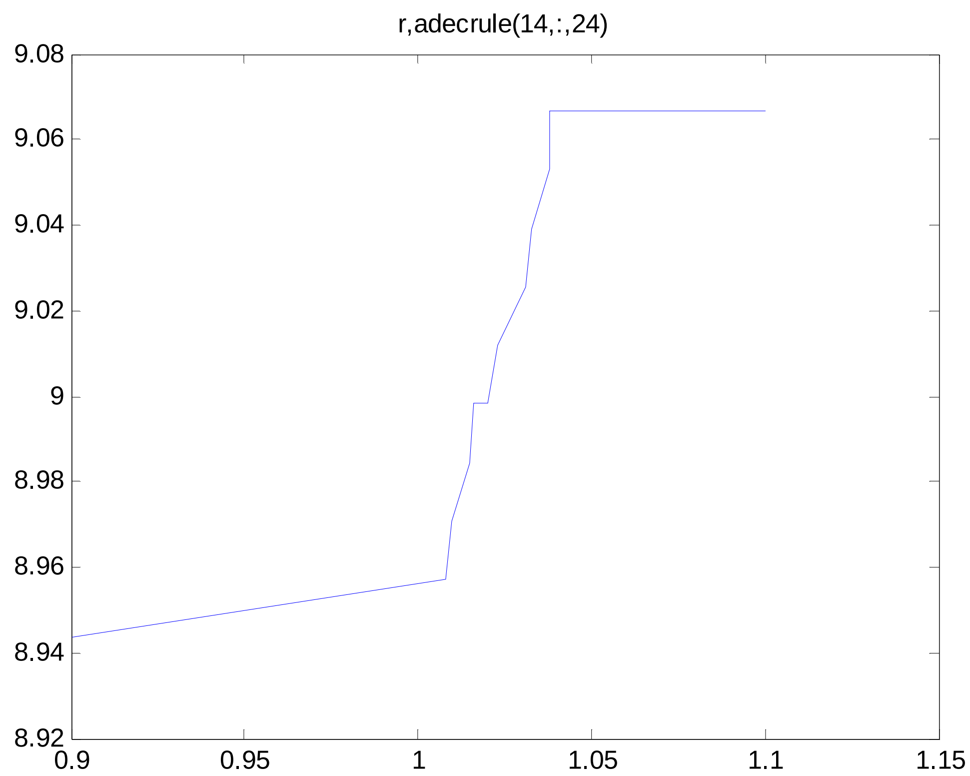

r,adecrule(14,:,19)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

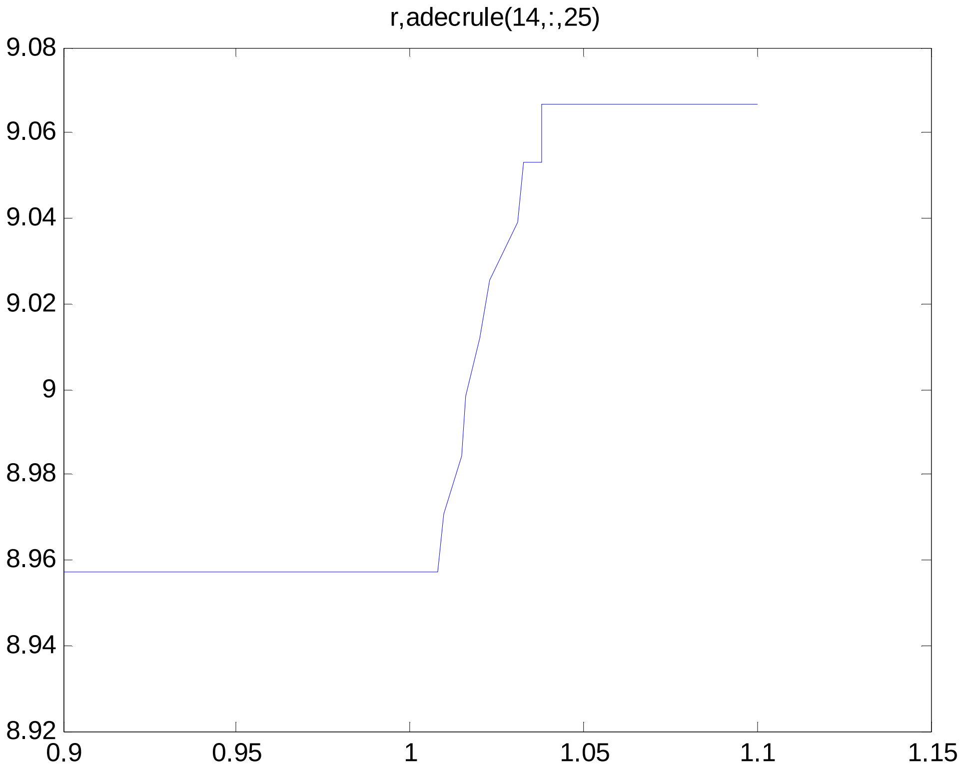

r,adecrule(14,:,20)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

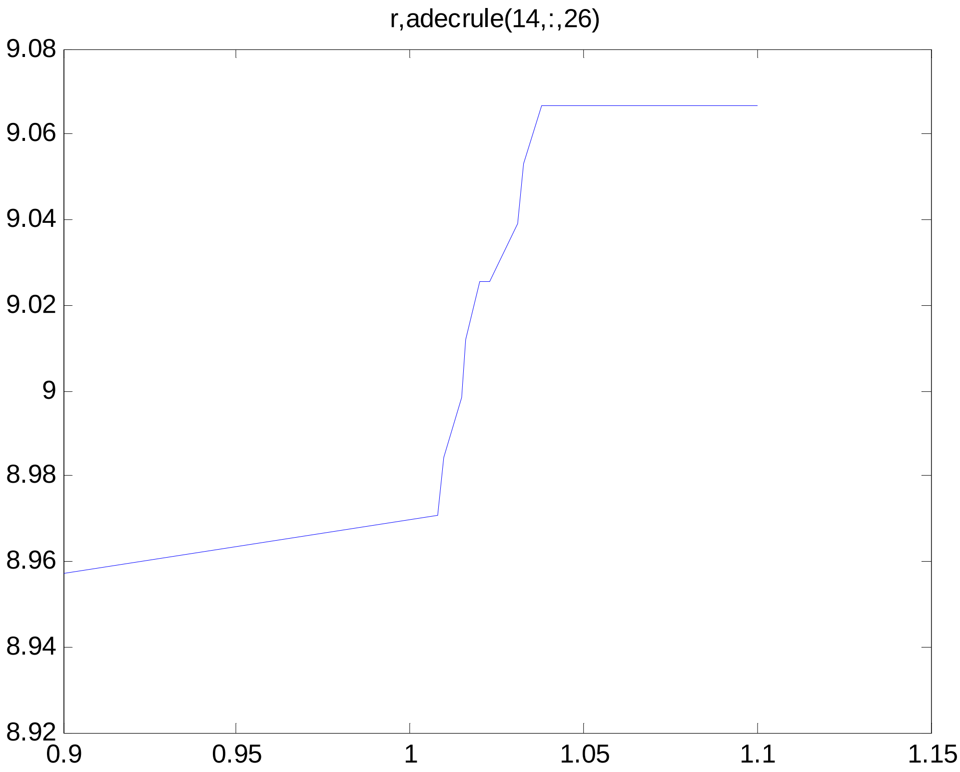

r,adecrule(14,:,21)
9.15
9.1
9.05
9
8.95
8.9
8.85
8.8
0.9
0.95
1
1.05
1.1
1.15

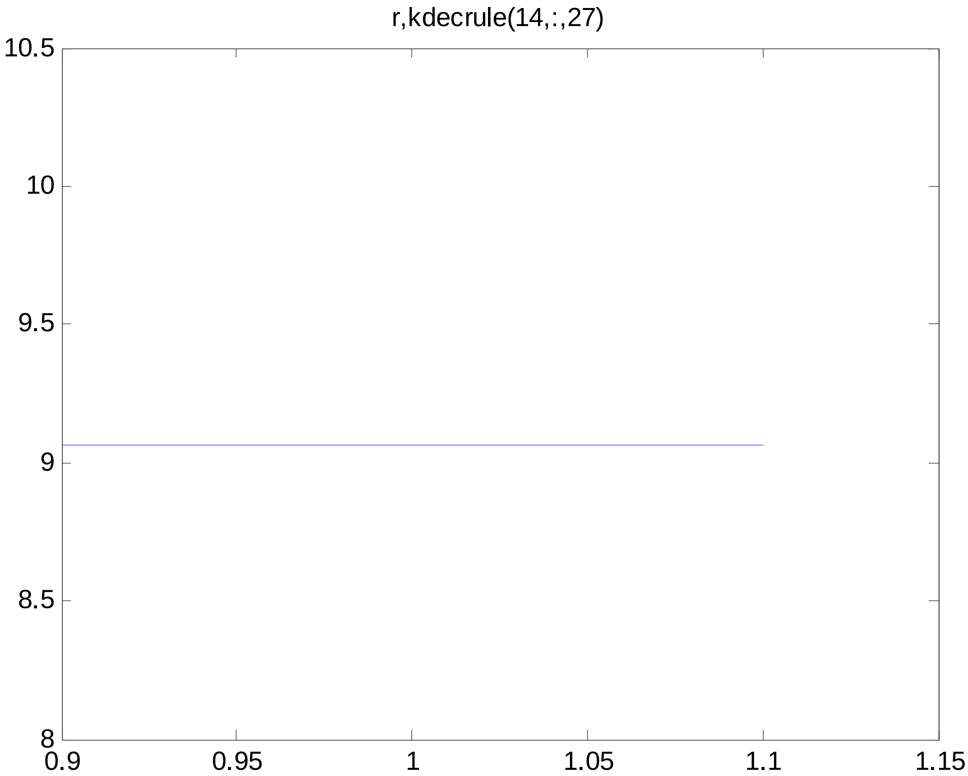

r,adecrule(14,:,22)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
8.9
0.9
0.95
1
1.05
1.1
1.15


r,adecrule(14,:,23)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
0.9
0.95
1
1.05
1.1
1.15

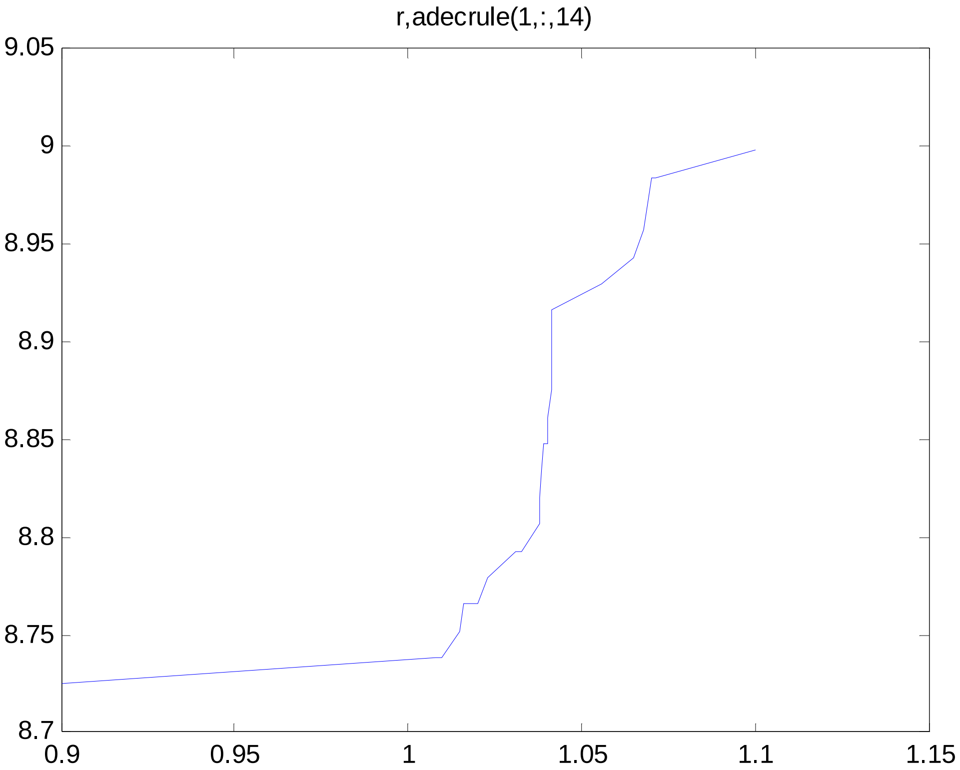

r,adecrule(14,:,24)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
0.9
0.95
1
1.05
1.1
1.15

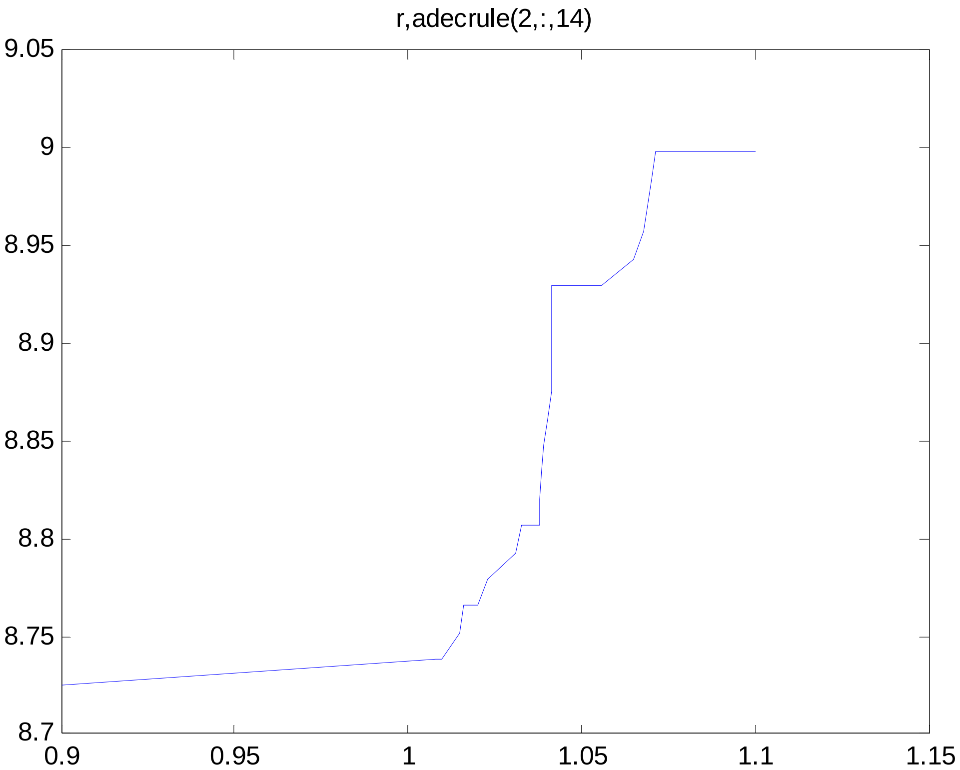

r,adecrule(14,:,25)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
0.9
0.95
1
1.05
1.1
1.15


r,adecrule(14,:,26)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
0.9
0.95
1
1.05
1.1
1.15

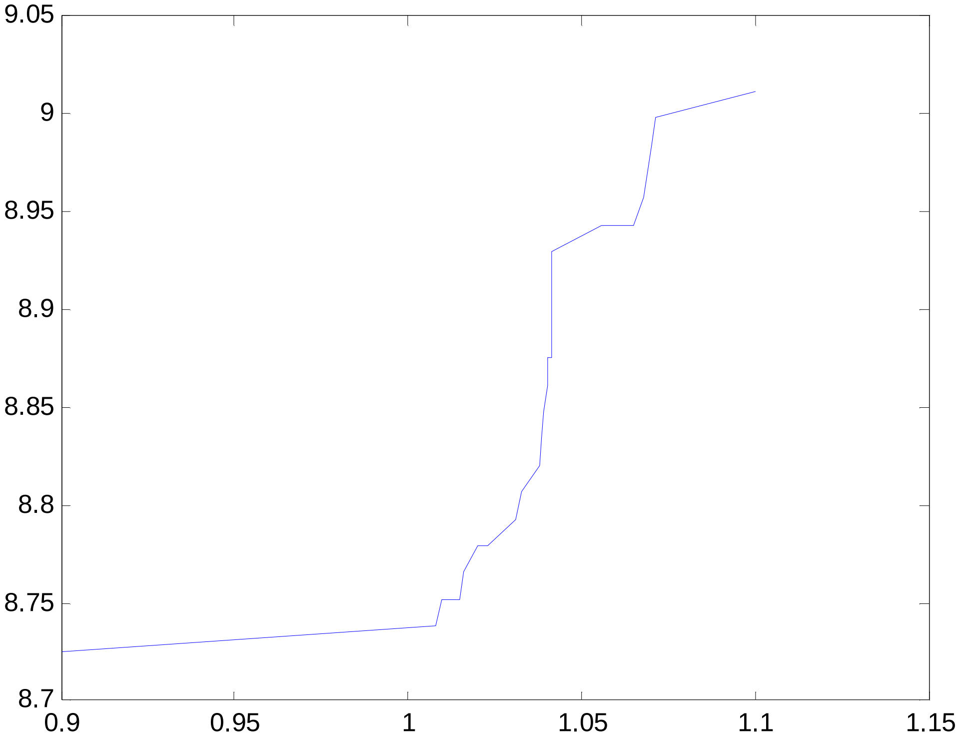

r,kdecrule(14,:,27)
10.5
10
9.5
9
8.5
8
0.9
0.95
1
1.05
1.1
1.15

Case_2

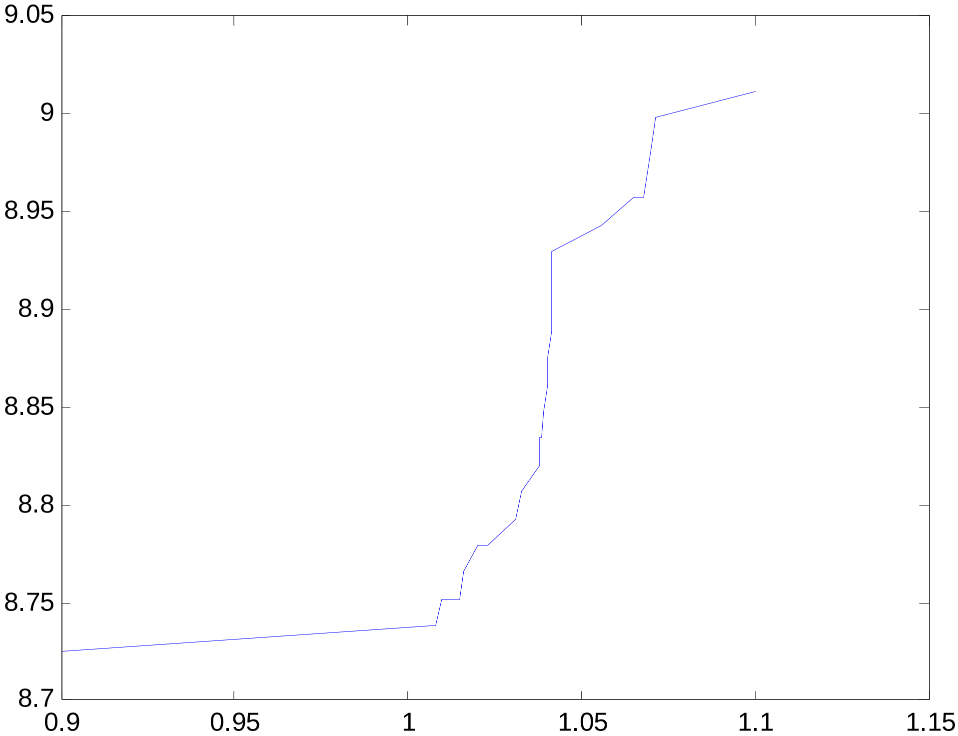

r,adecrule(1,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

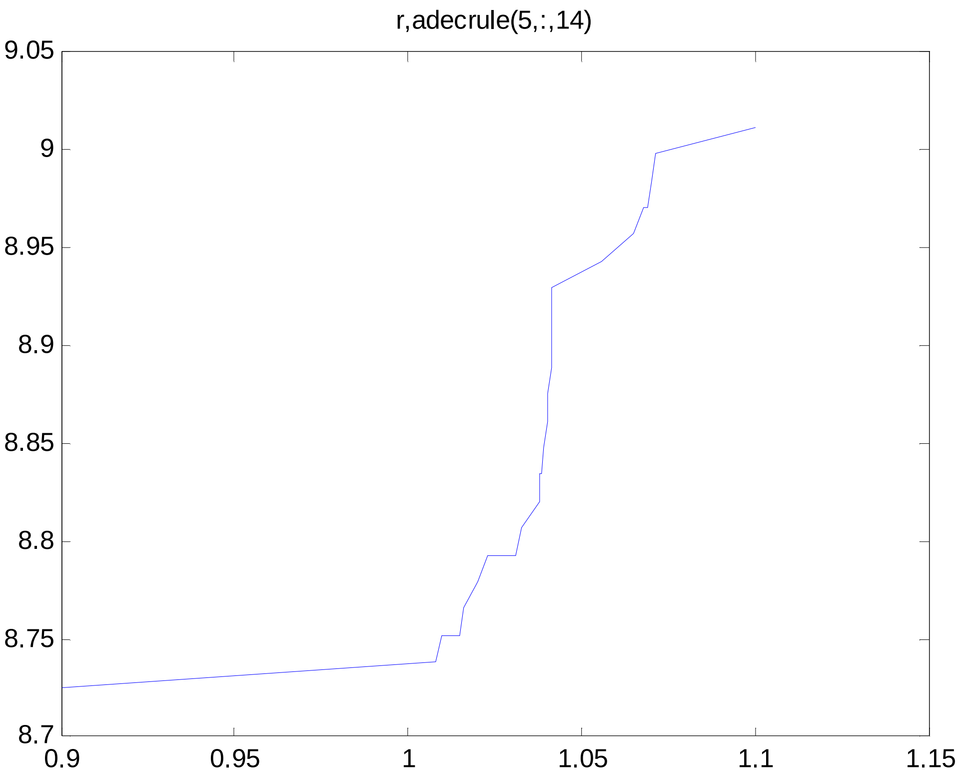

r,adecrule(2,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

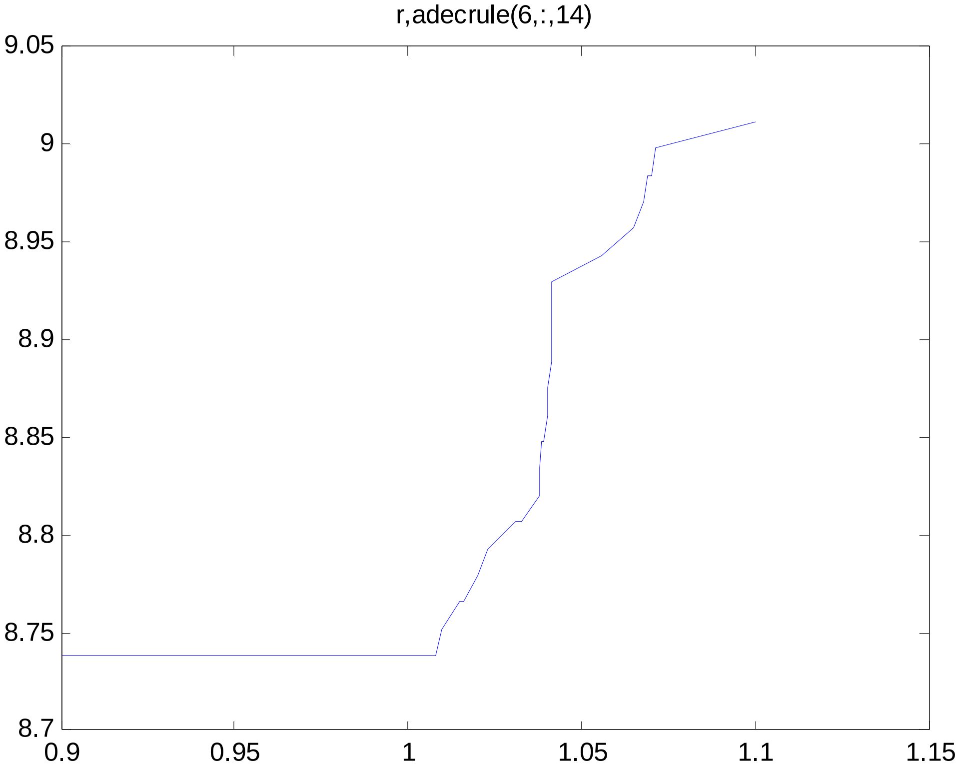
r,adecrule(3,:,14)

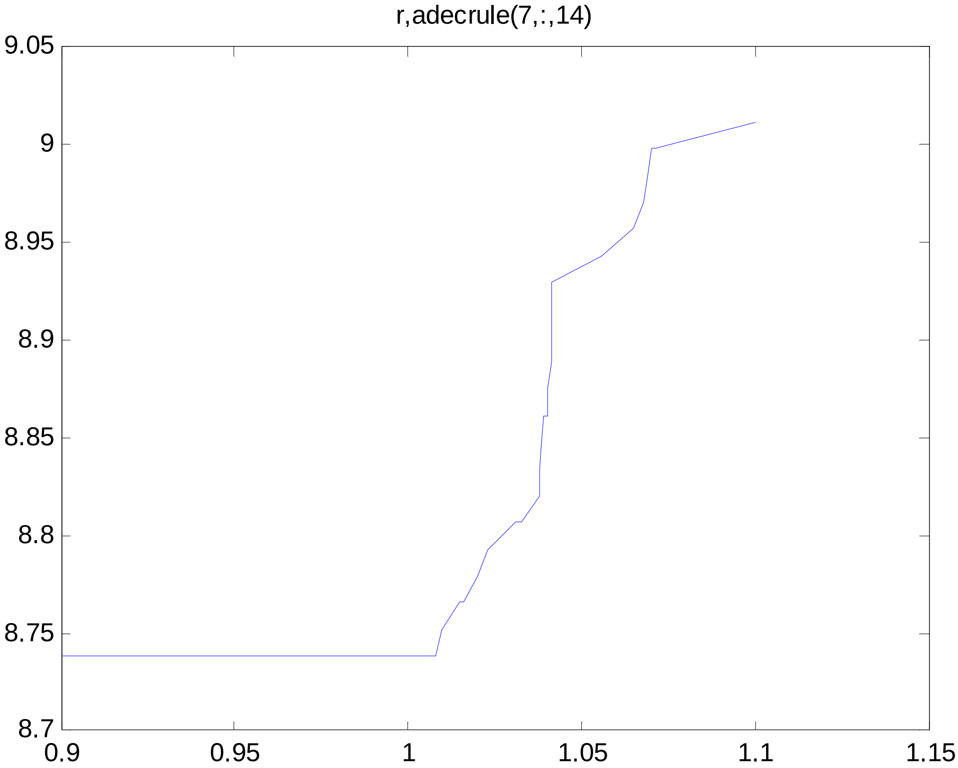


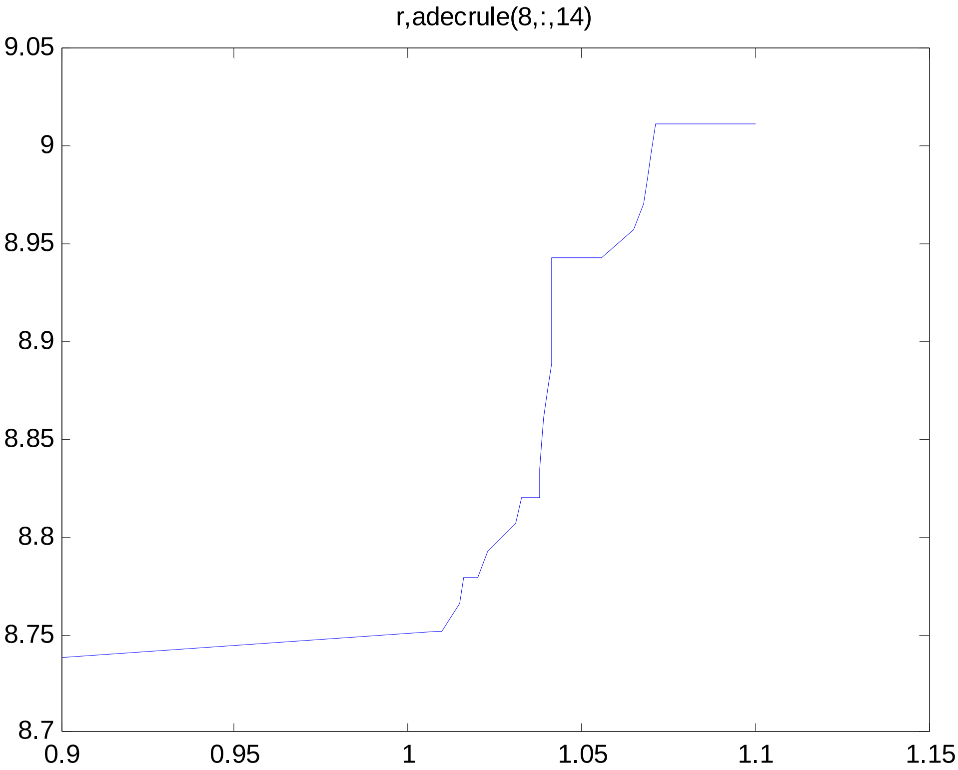
r,adecrule(4,:,14)

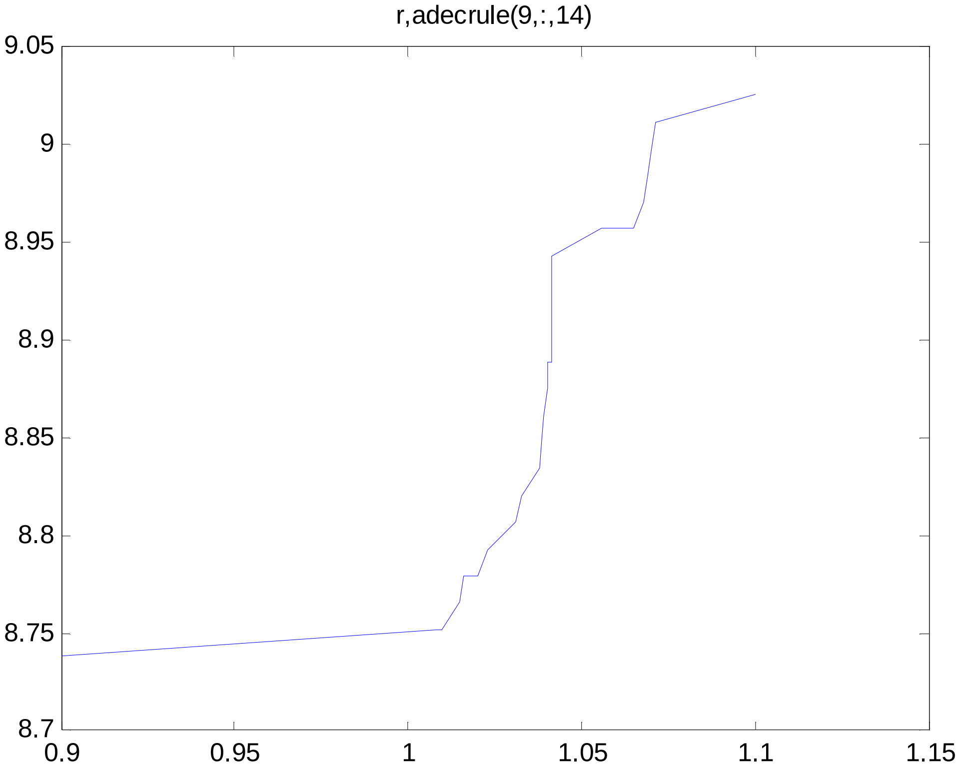


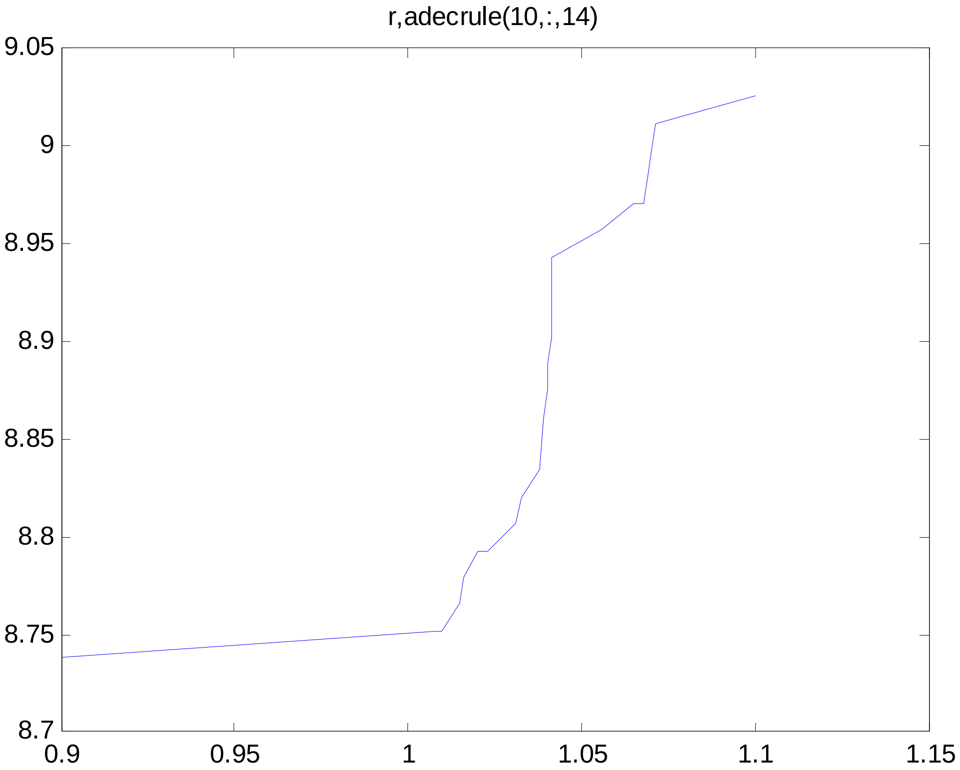

r,adecrule(5,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15


r,adecrule(6,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

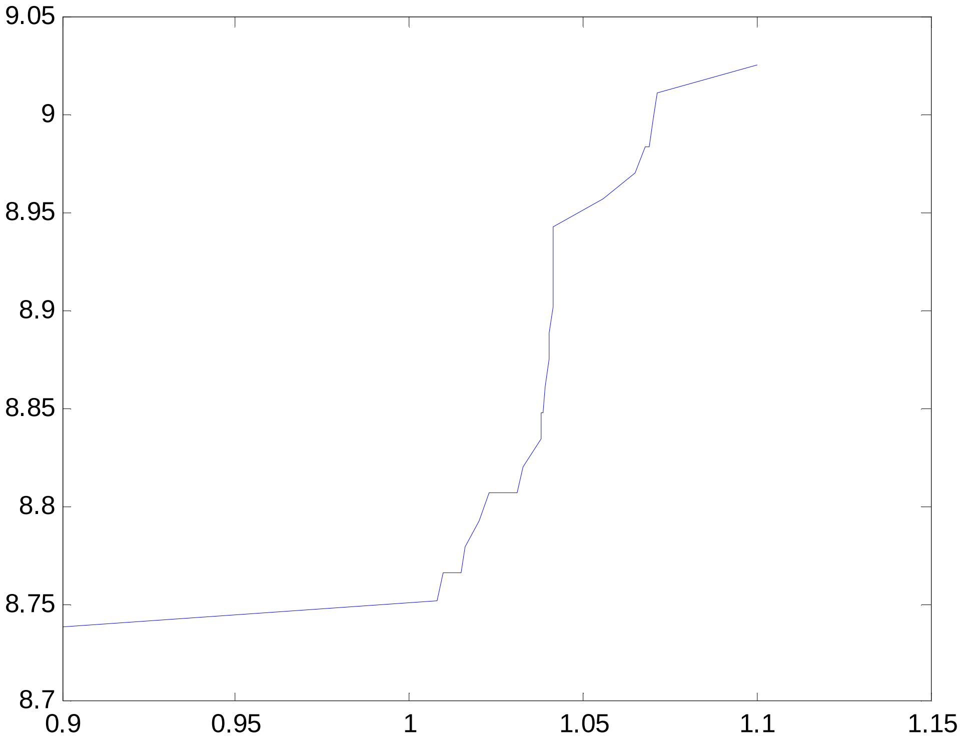

r,adecrule(7,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15


r,adecrule(8,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

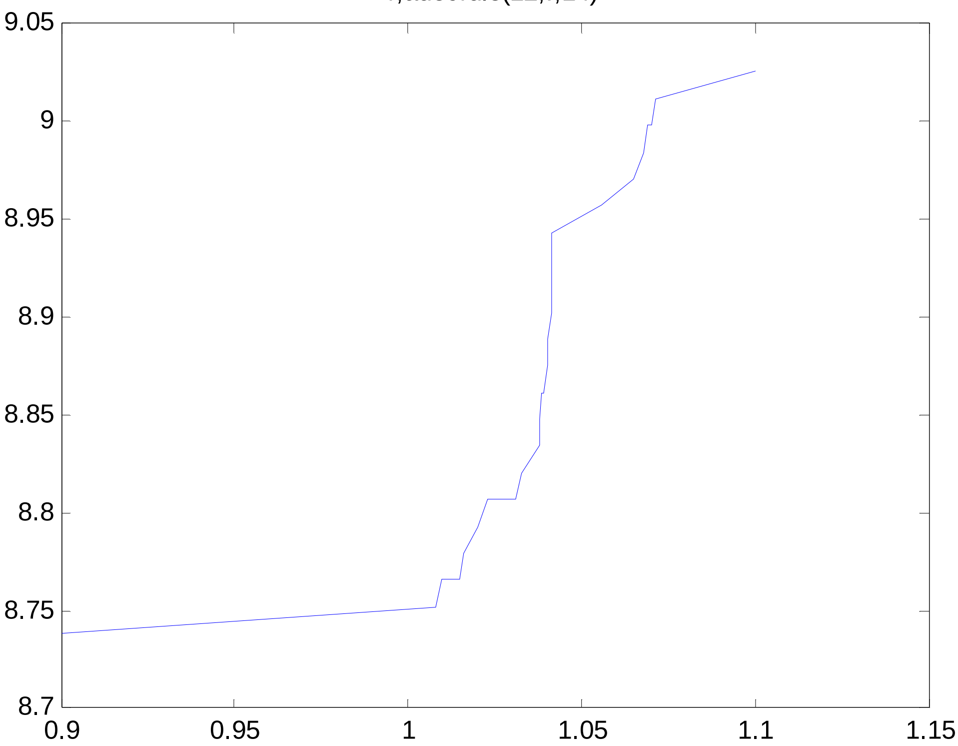

r,adecrule(9,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

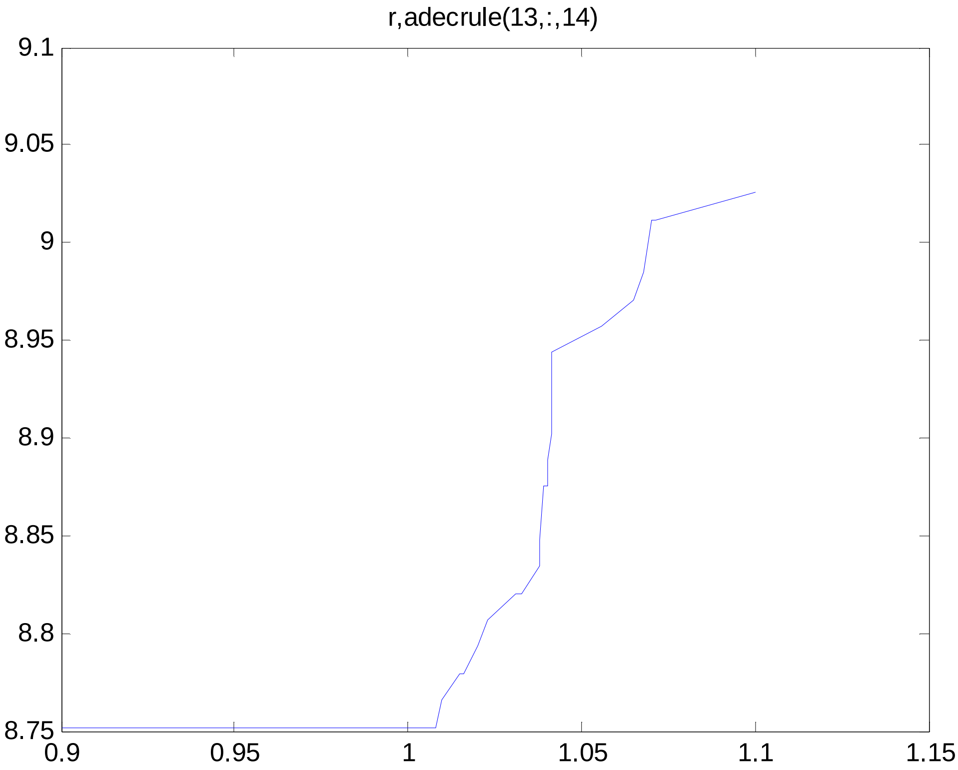

r,adecrule(10,:,14)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
0.9
0.95
1
1.05
1.1
1.15

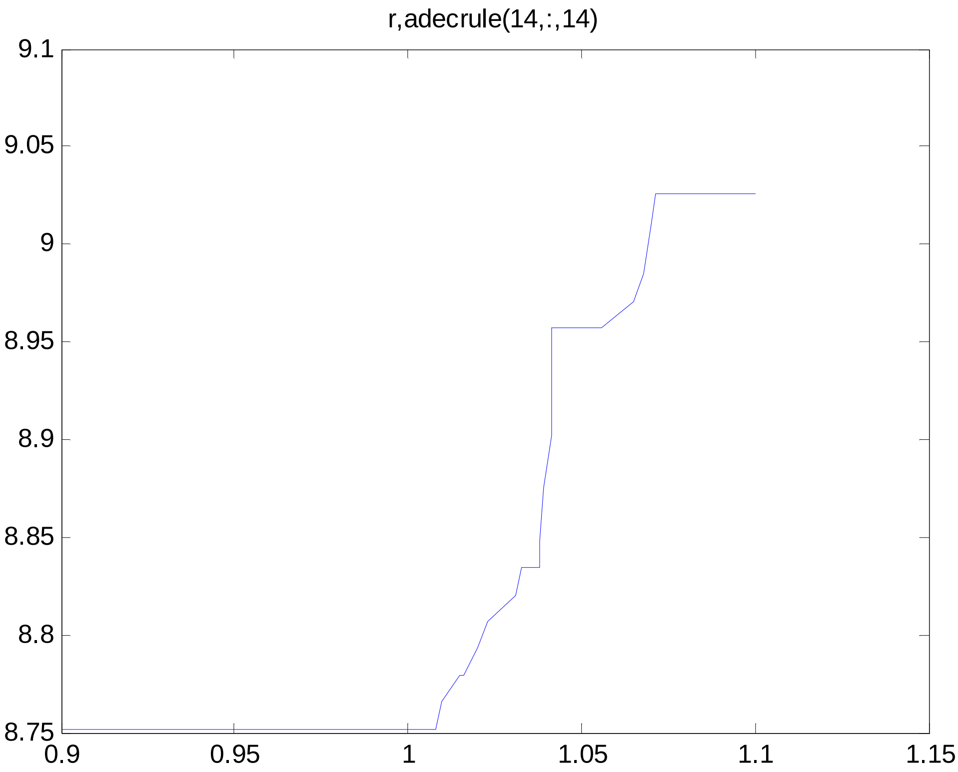
r,adecrule(11,:,14)

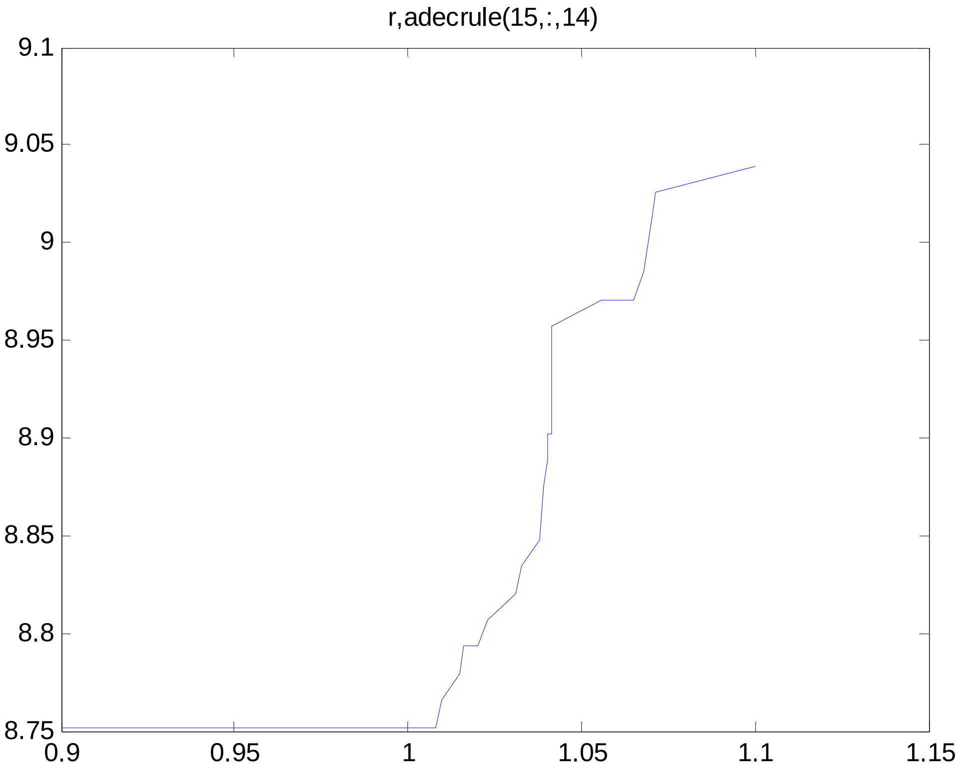


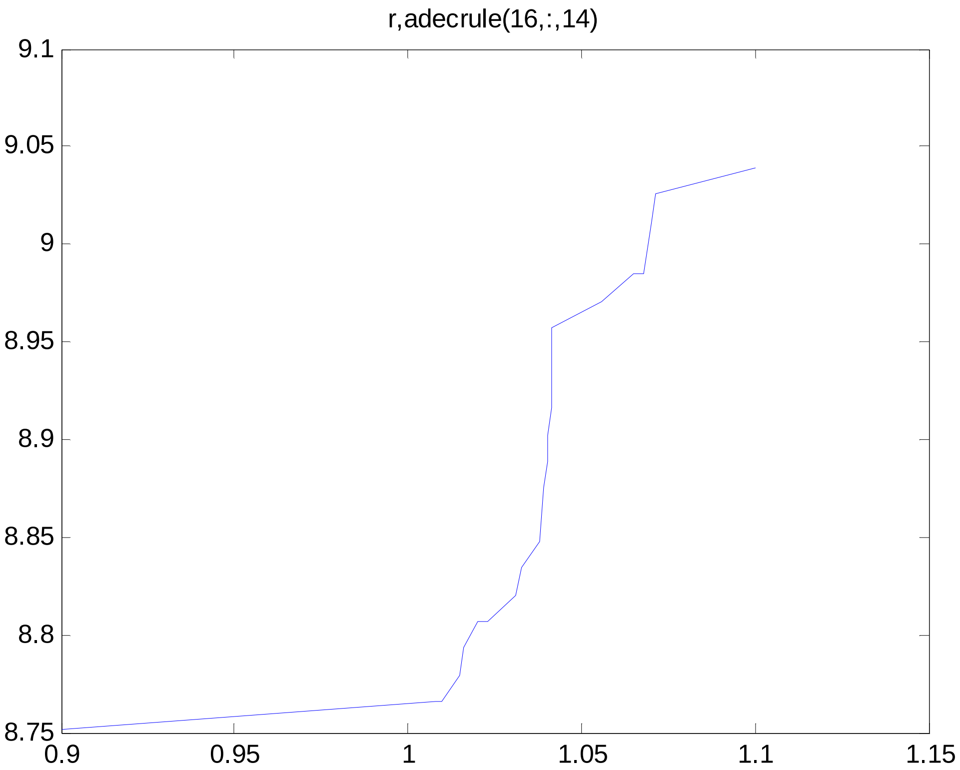
r,adecrule(12,:,14)

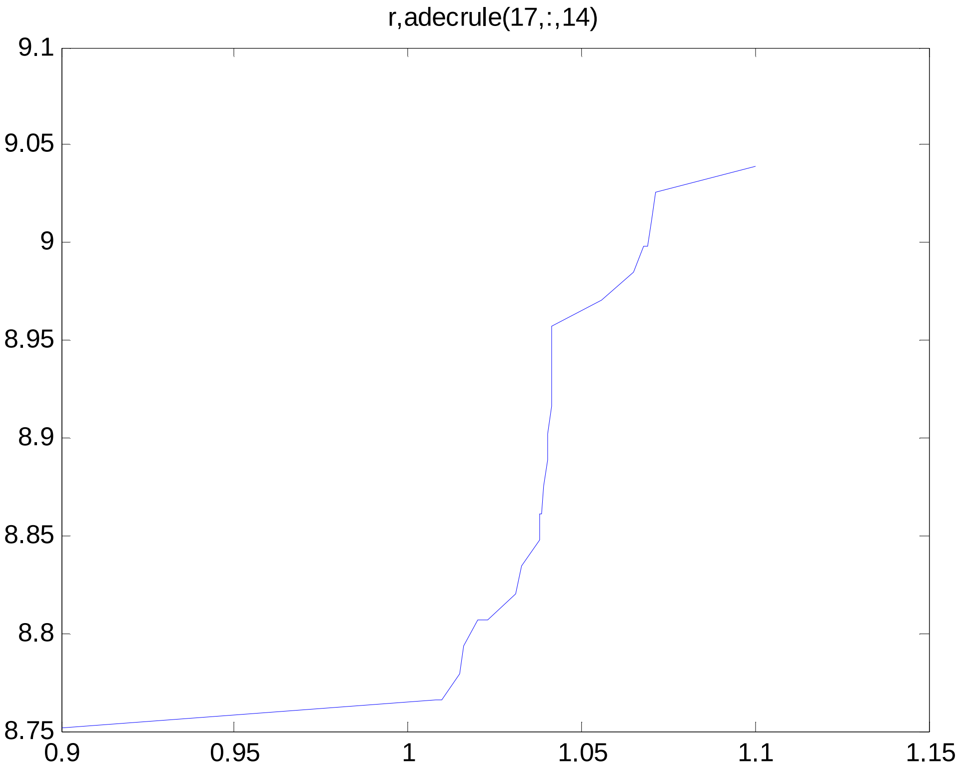


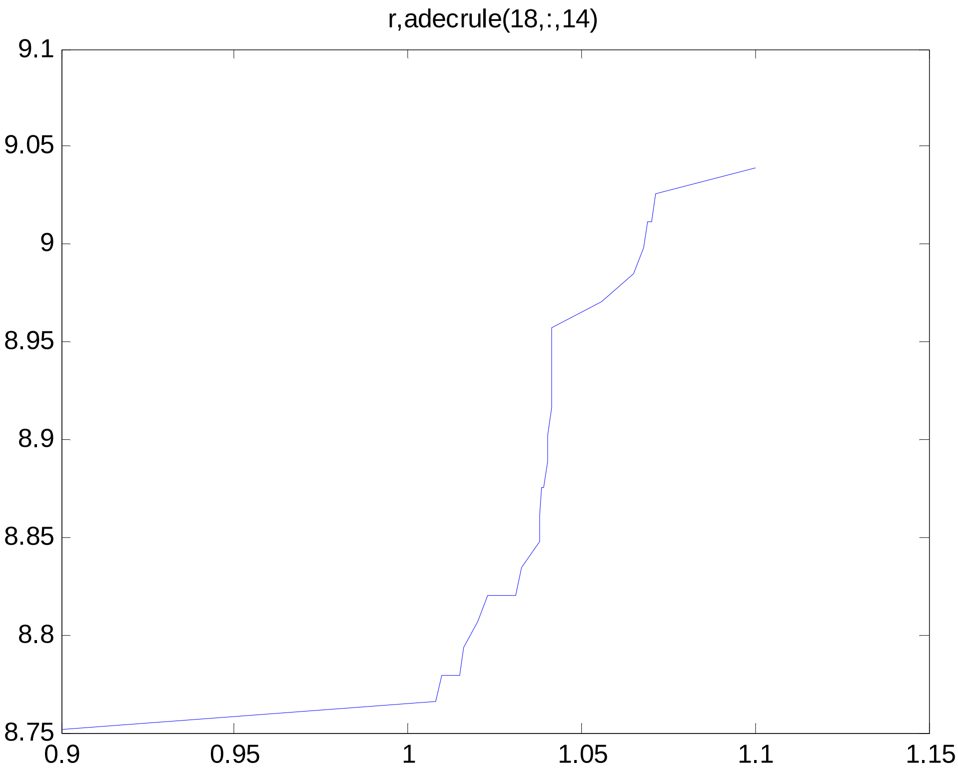

r,adecrule(13,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

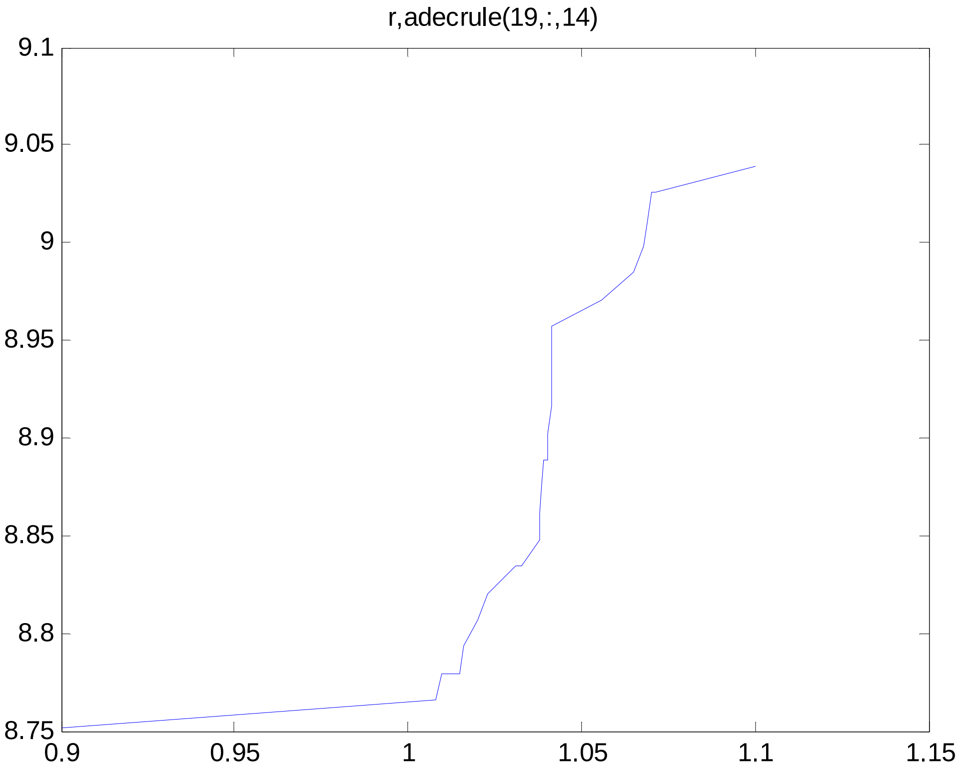

r,adecrule(14,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

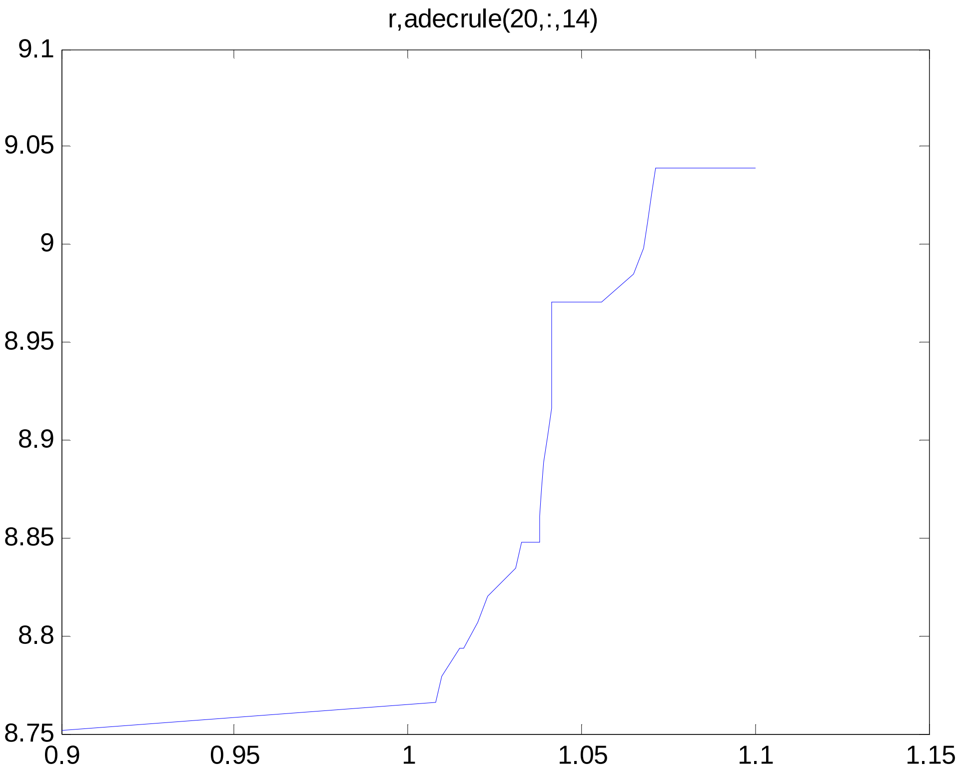

r,adecrule(15,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

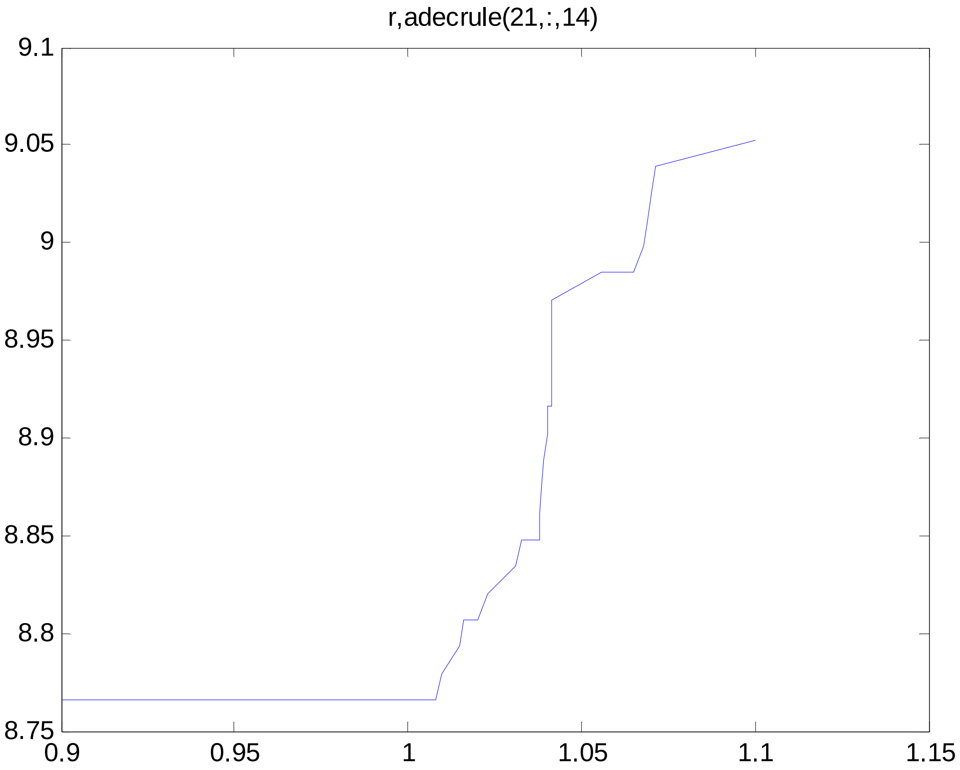

r,adecrule(16,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

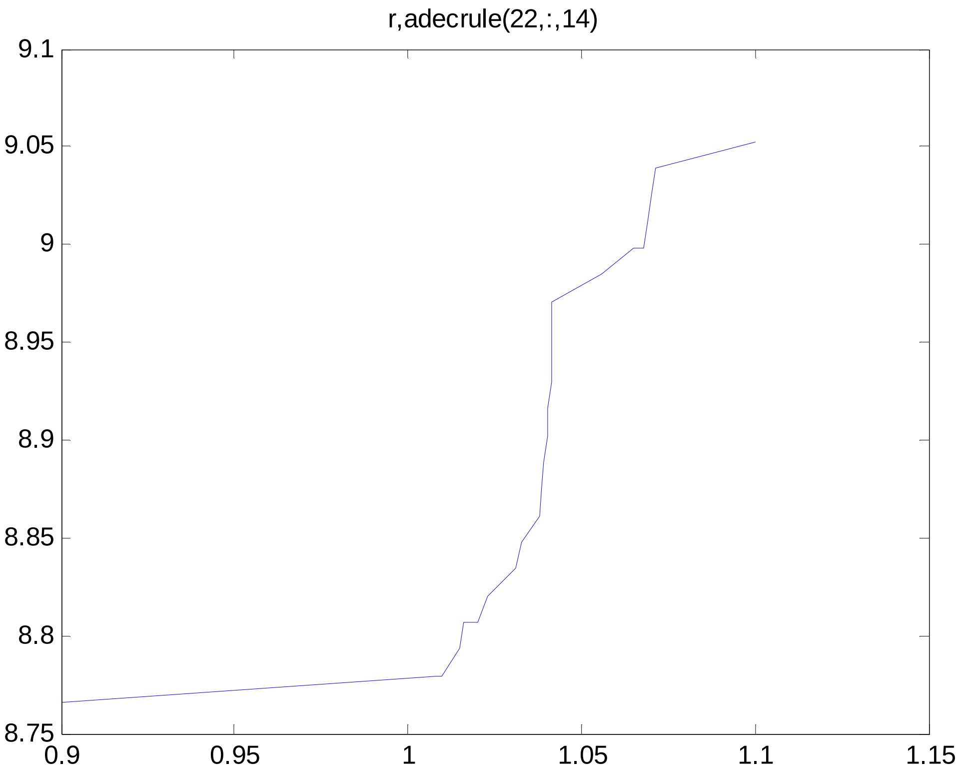

r,adecrule(17,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

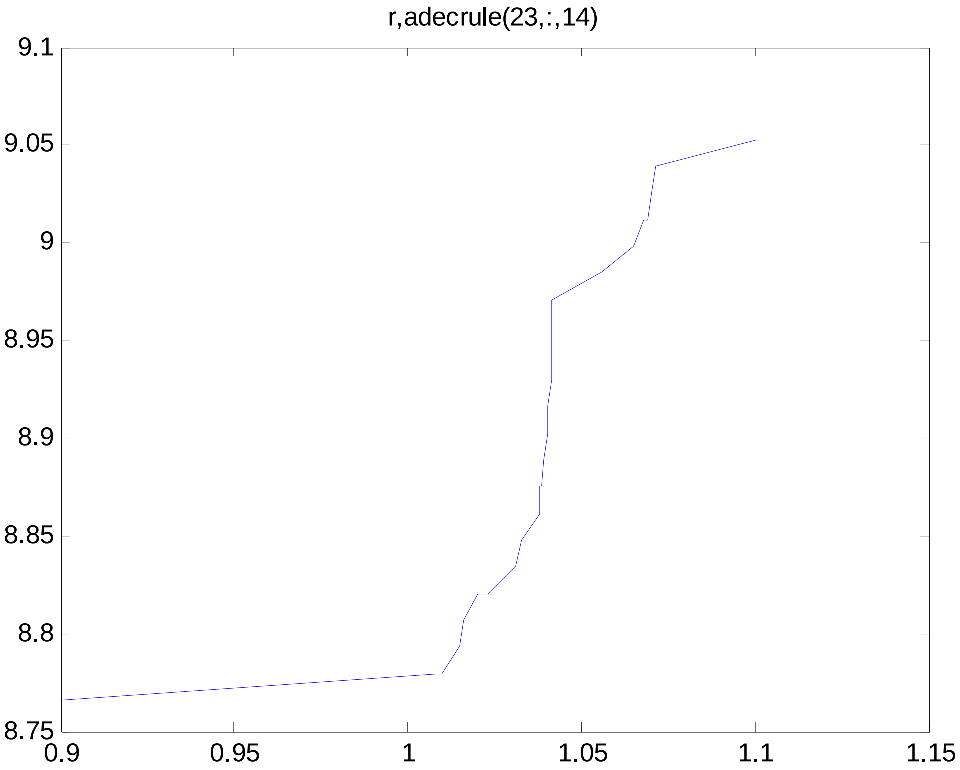

r,adecrule(18,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

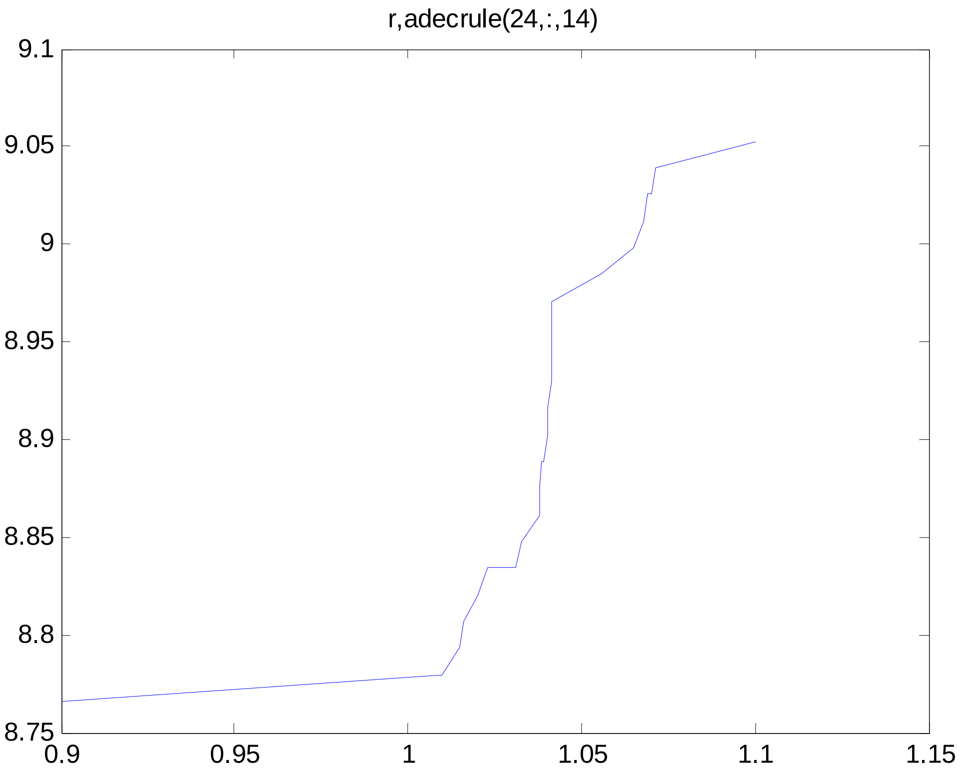

r,adecrule(19,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

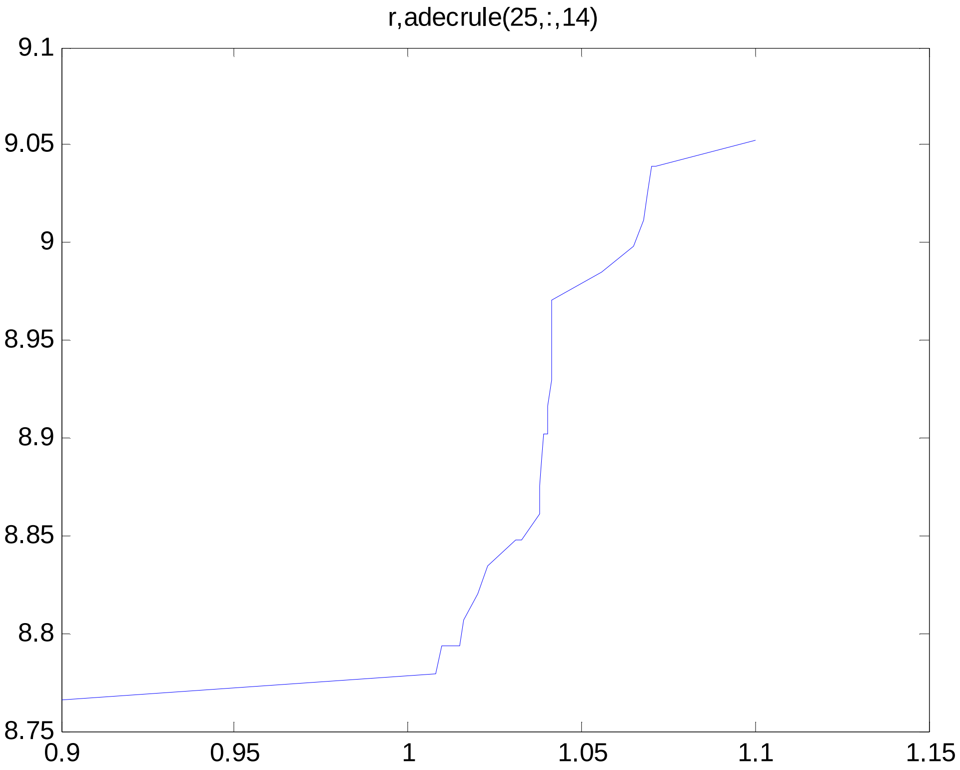

r,adecrule(20,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

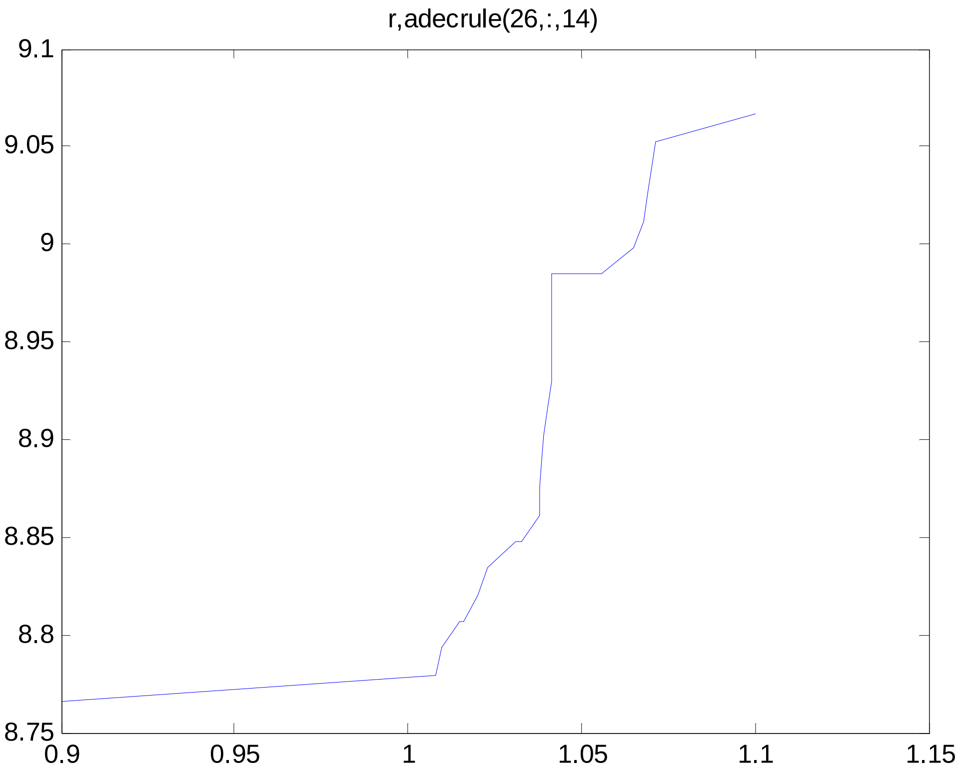

r,adecrule(21,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

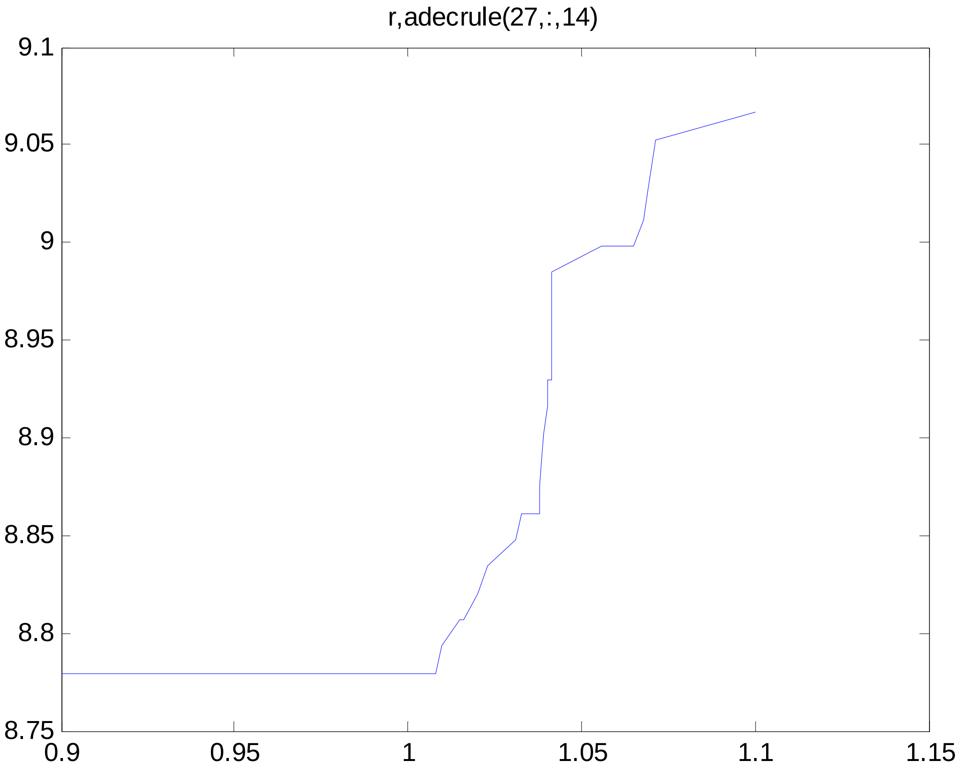

r,adecrule(22,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15


r,adecrule(23,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

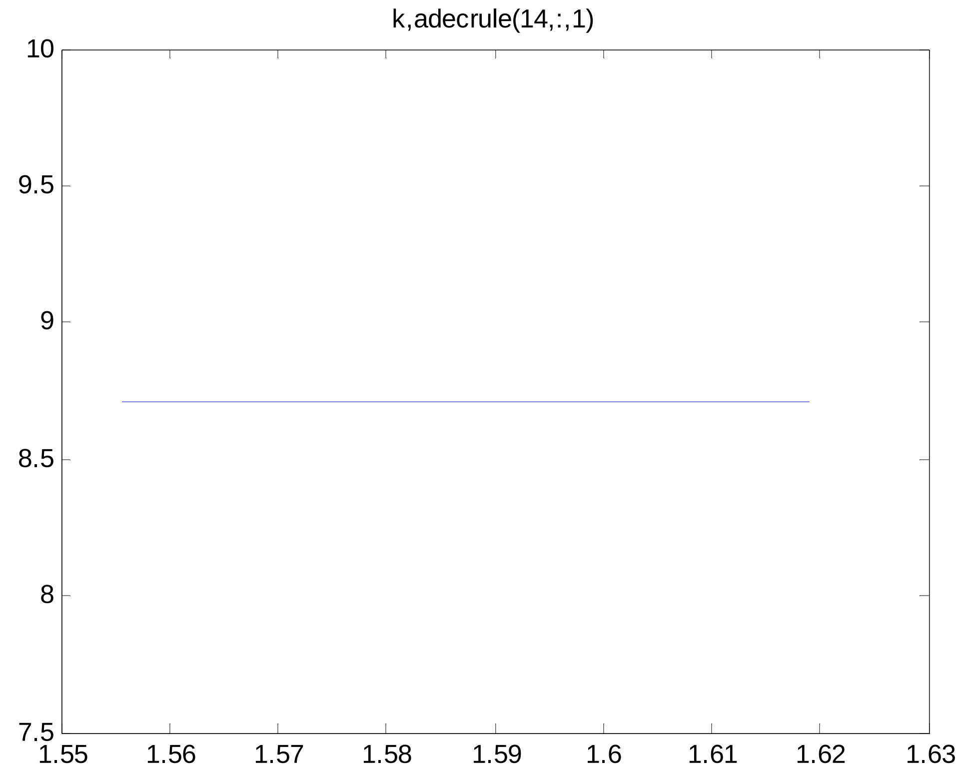

r,adecrule(24,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

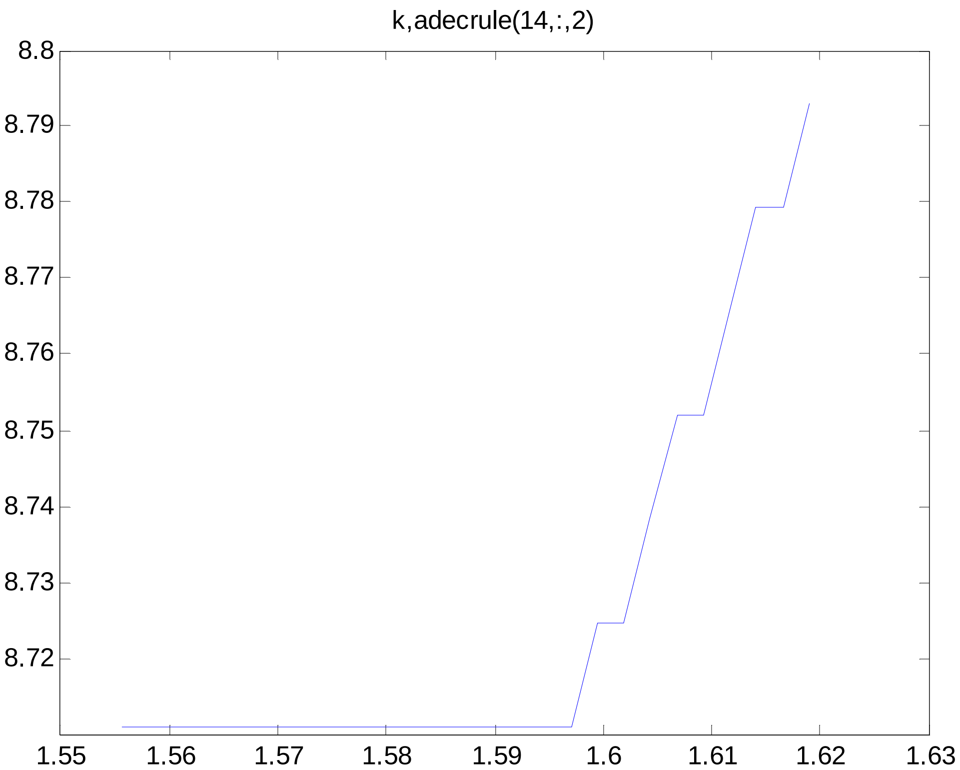

r,adecrule(25,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

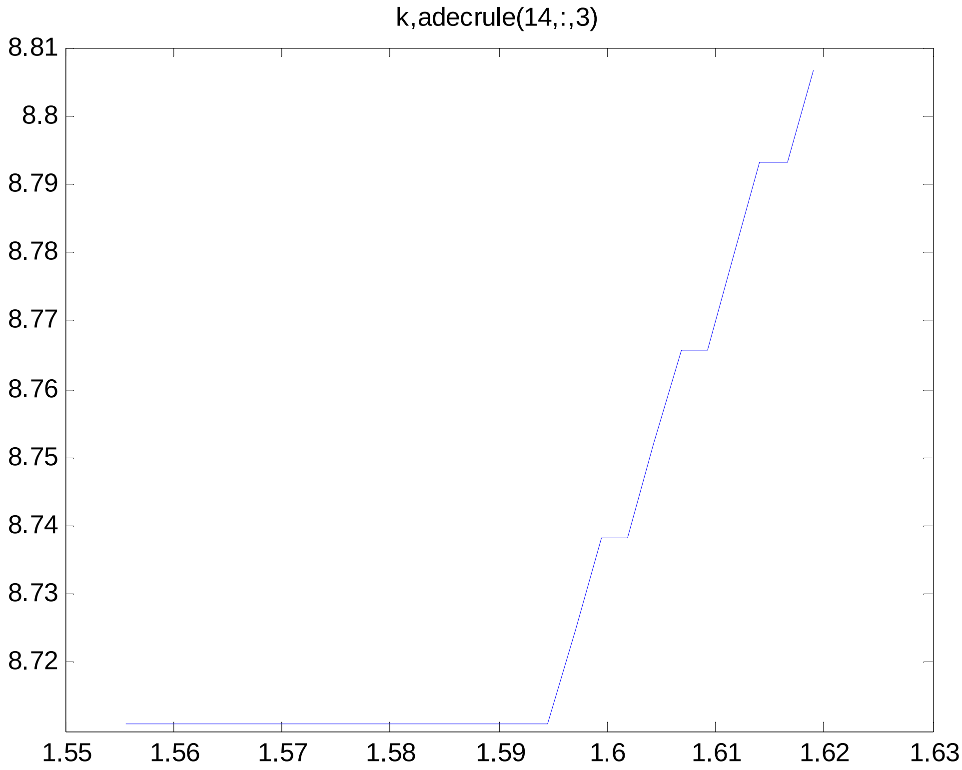

r,adecrule(26,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

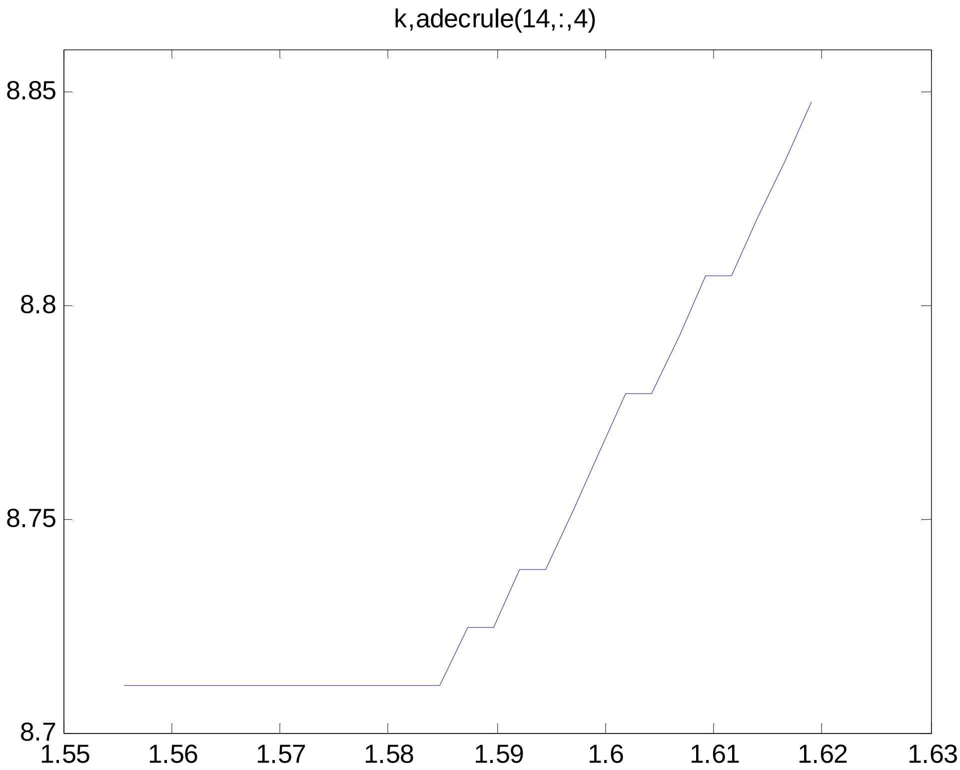

r,adecrule(27,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
0.9
0.95
1
1.05
1.1
1.15

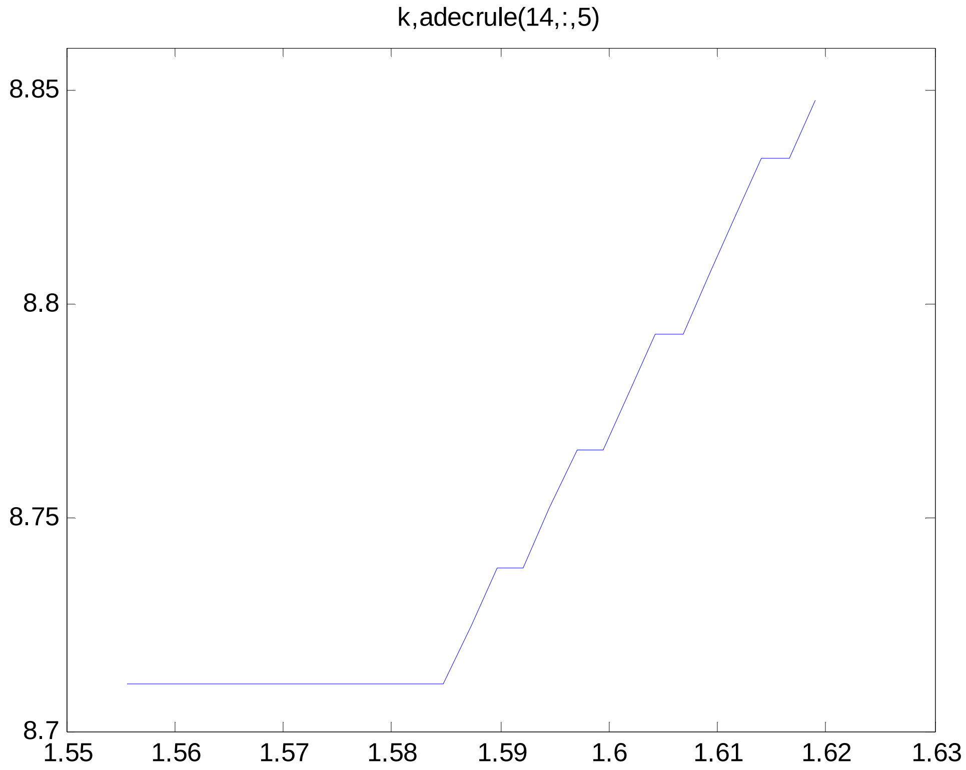
Case_3

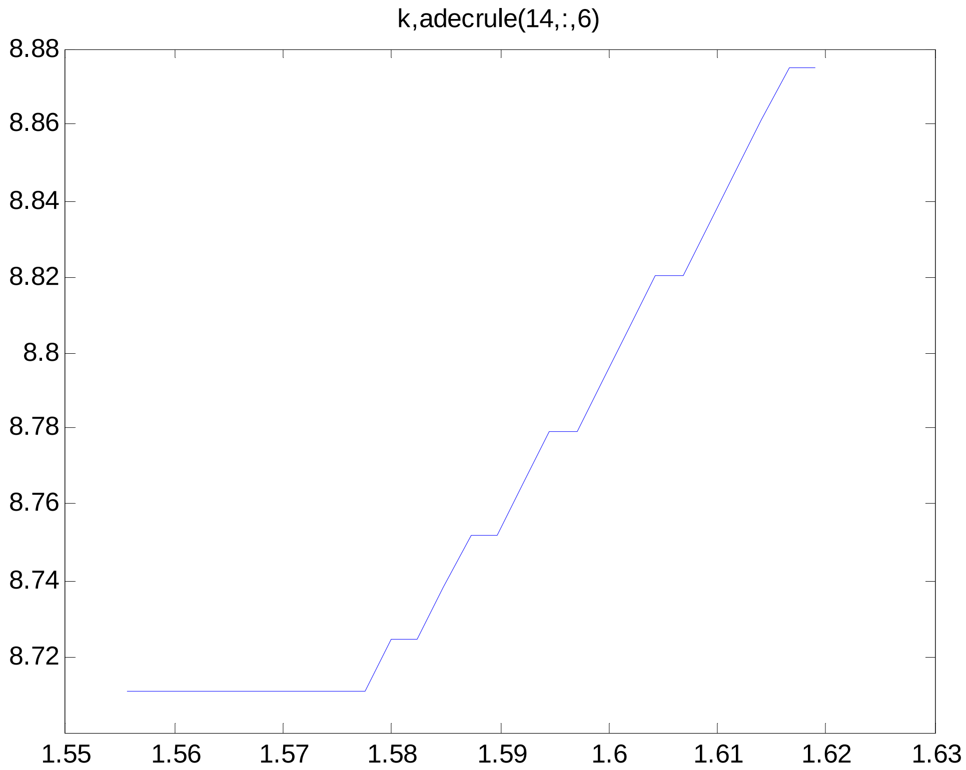

k,adecrule(14,:,1)
10
9.5
9
8.5
8
7.5
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

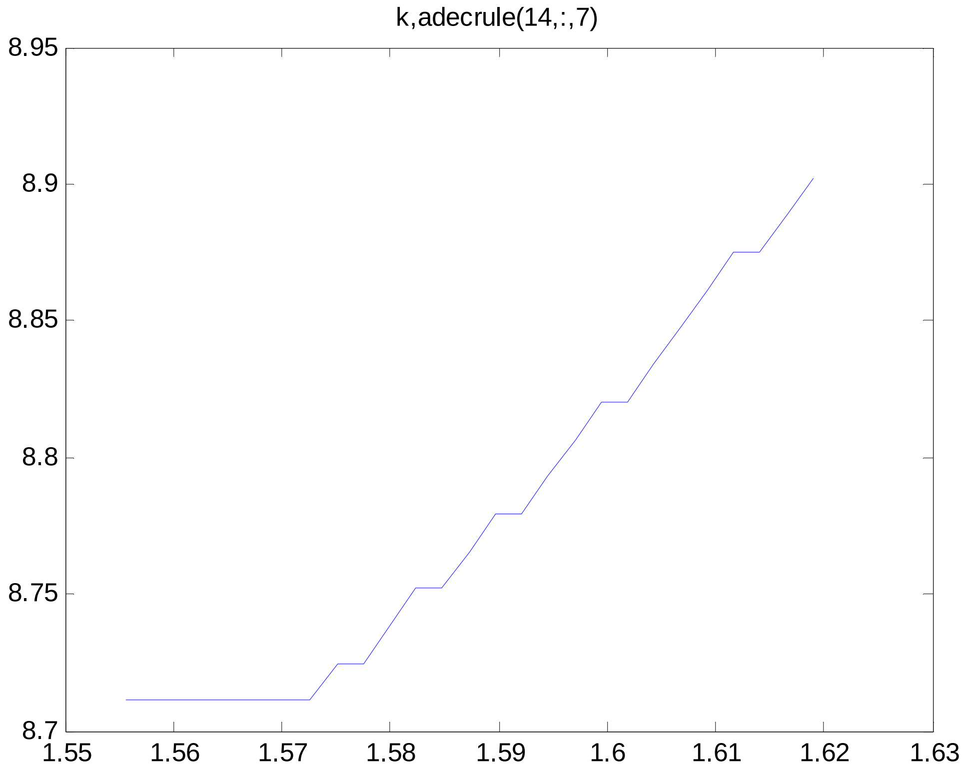

k,adecrule(14,:,2)
8.8
8.79
8.78
8.77
8.76
8.75
8.74
8.73
8.72
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

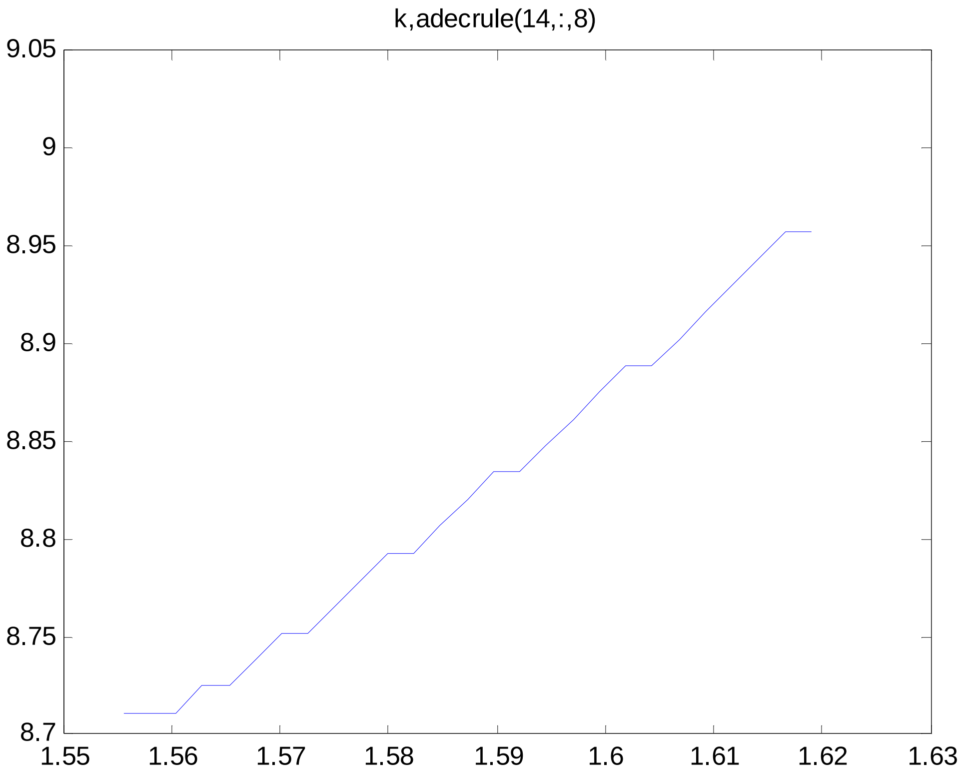

k,adecrule(14,:,3)
8.81
8.8
8.79
8.78
8.77
8.76
8.75
8.74
8.73
8.72
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

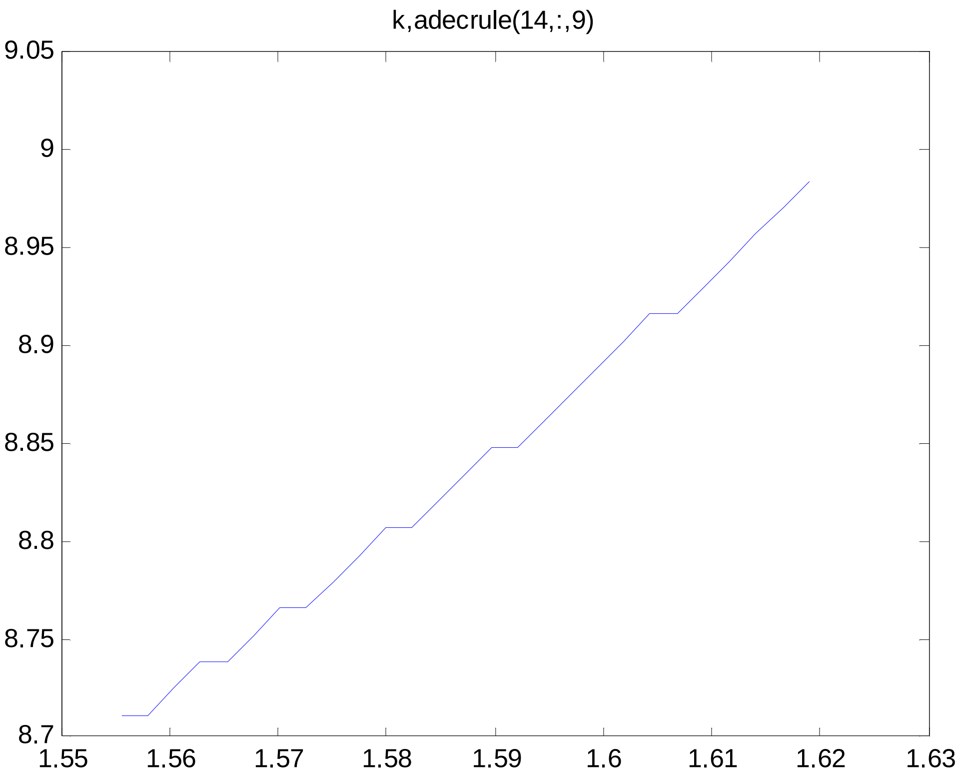

k,adecrule(14,:,4)
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

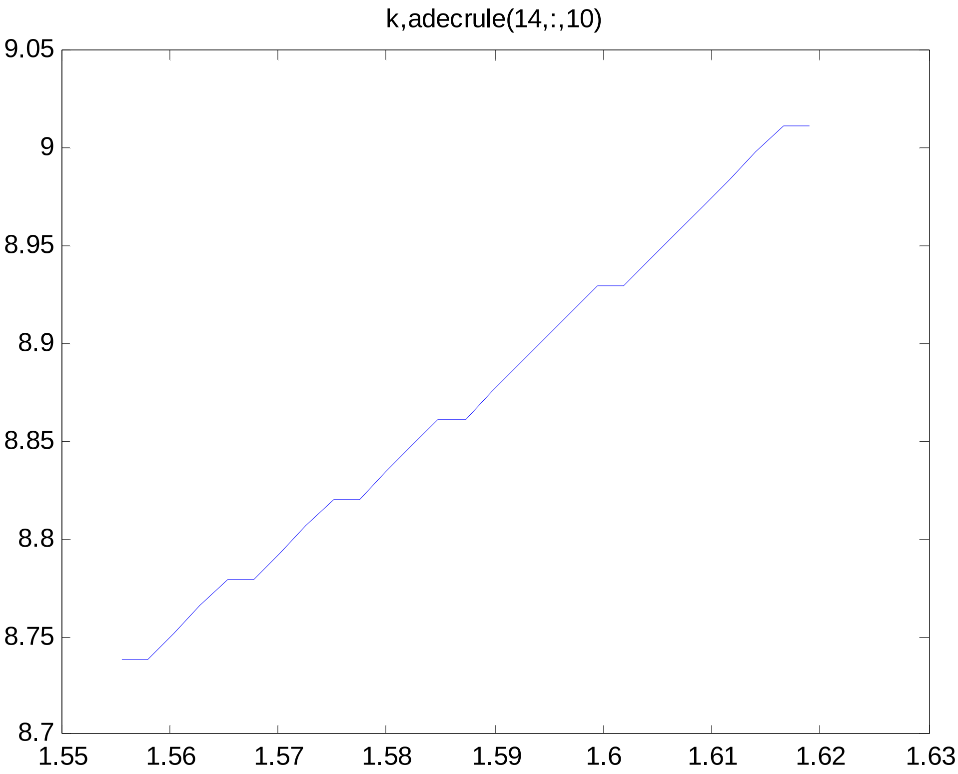

k,adecrule(14,:,5)
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

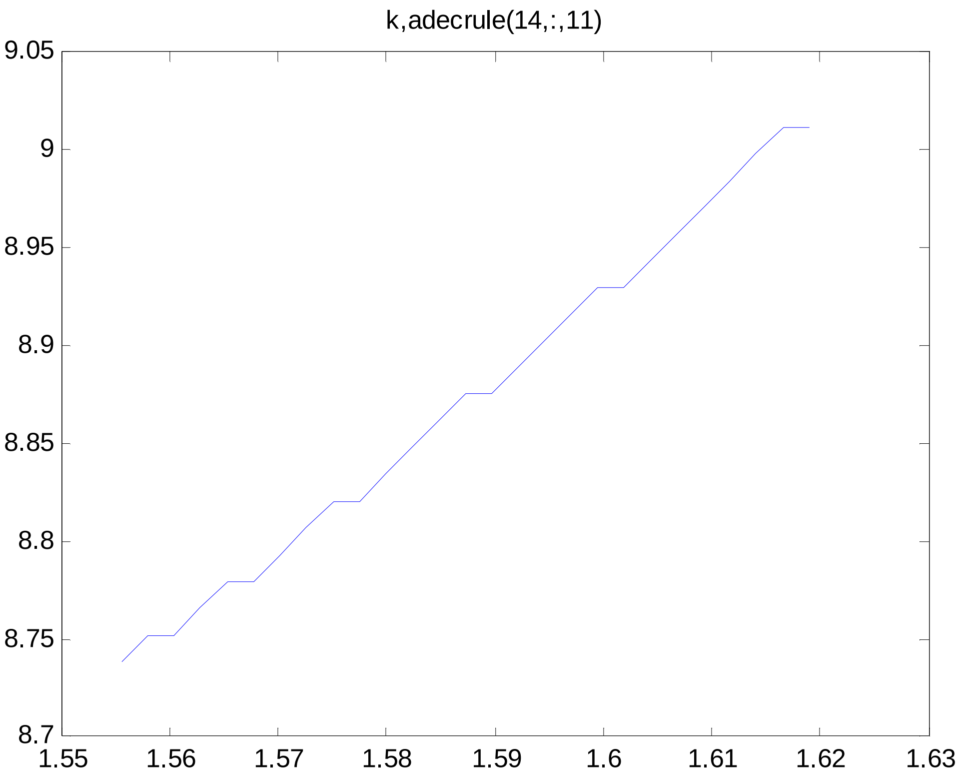

k,adecrule(14,:,6)
8.88
8.86
8.84
8.82
8.8
8.78
8.76
8.74
8.72
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,7)
8.95
8.9
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,8)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,9)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,10)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,11)
9.05
9
8.95
8.9
8.85
8.8
8.75
8.7
1.55
1.56
1.57
1.58
1.59
1.6
1.61
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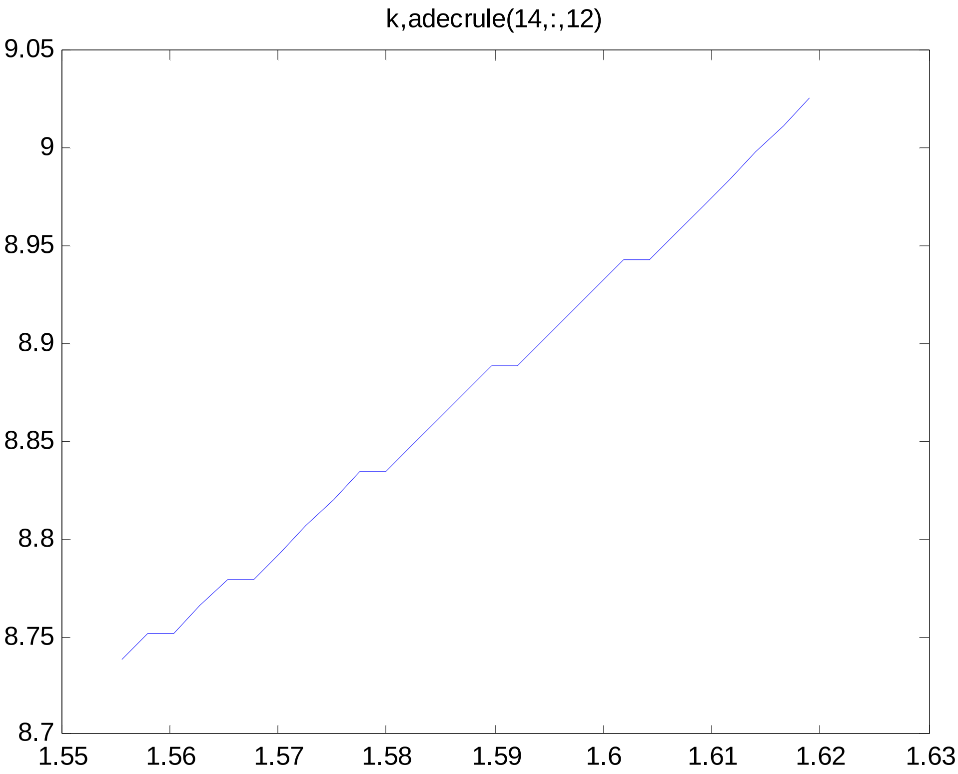
k,adecrule(14,:,12)
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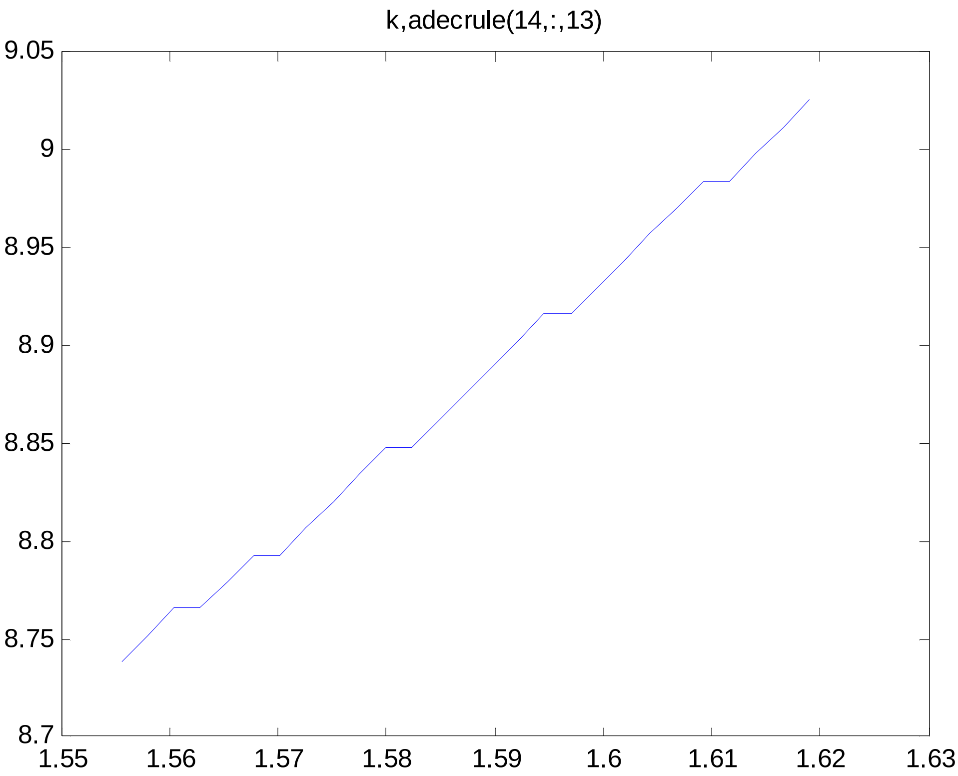
k,adecrule(14,:,13)
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8.85
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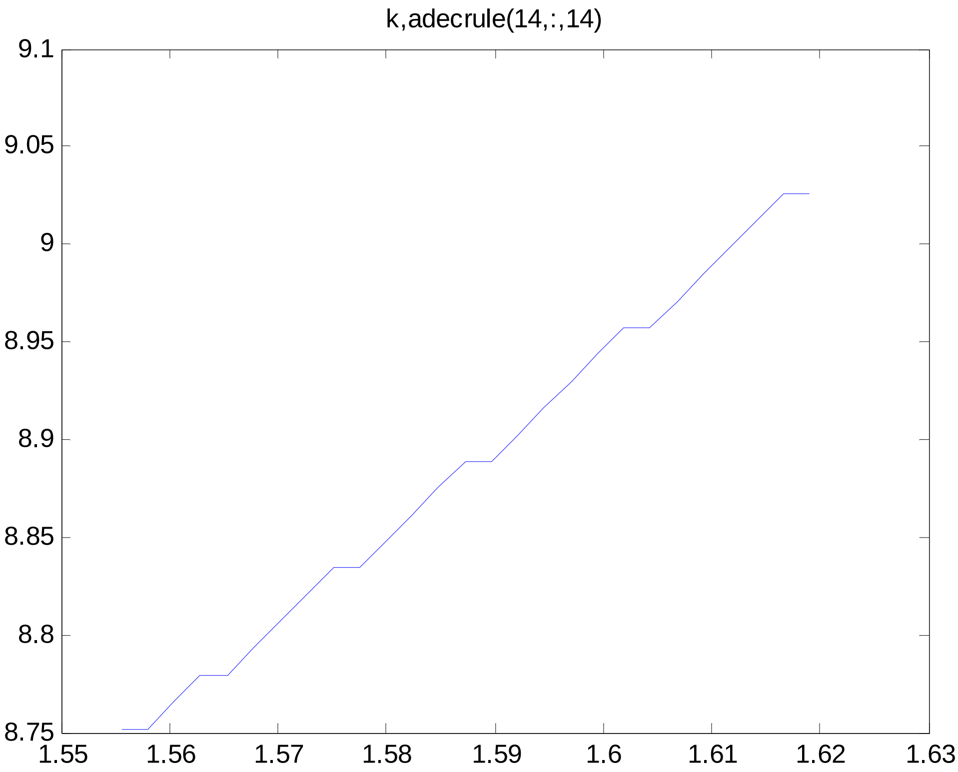
k,adecrule(14,:,14)
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8.9
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1.57
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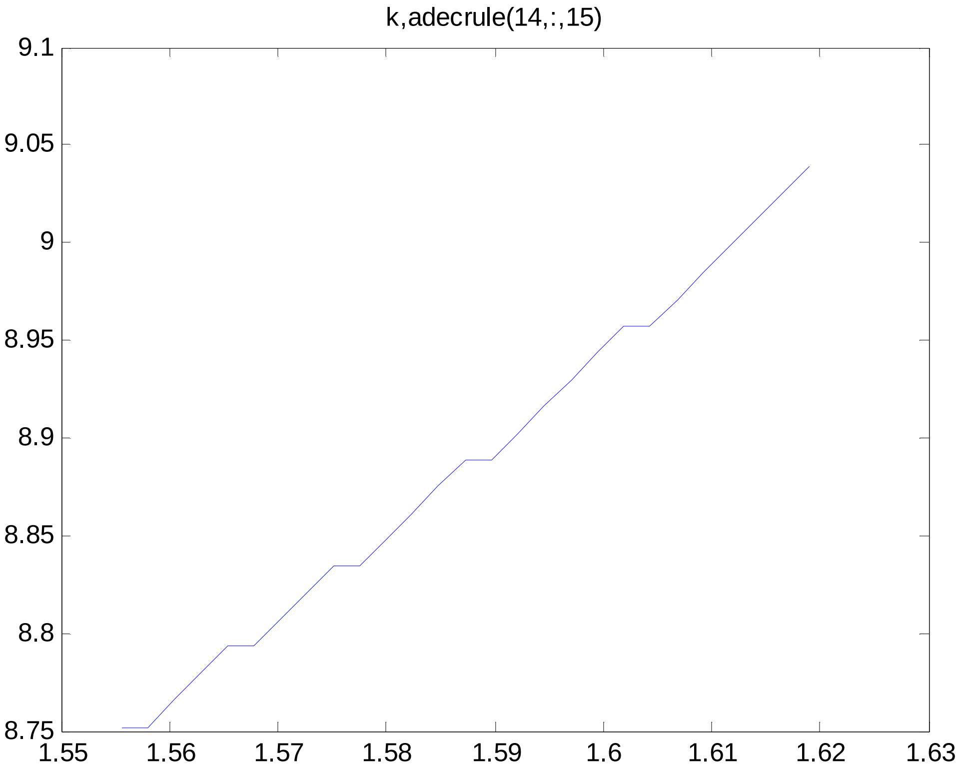
k,adecrule(14,:,15)
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8.9
8.85
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1.57
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1.59
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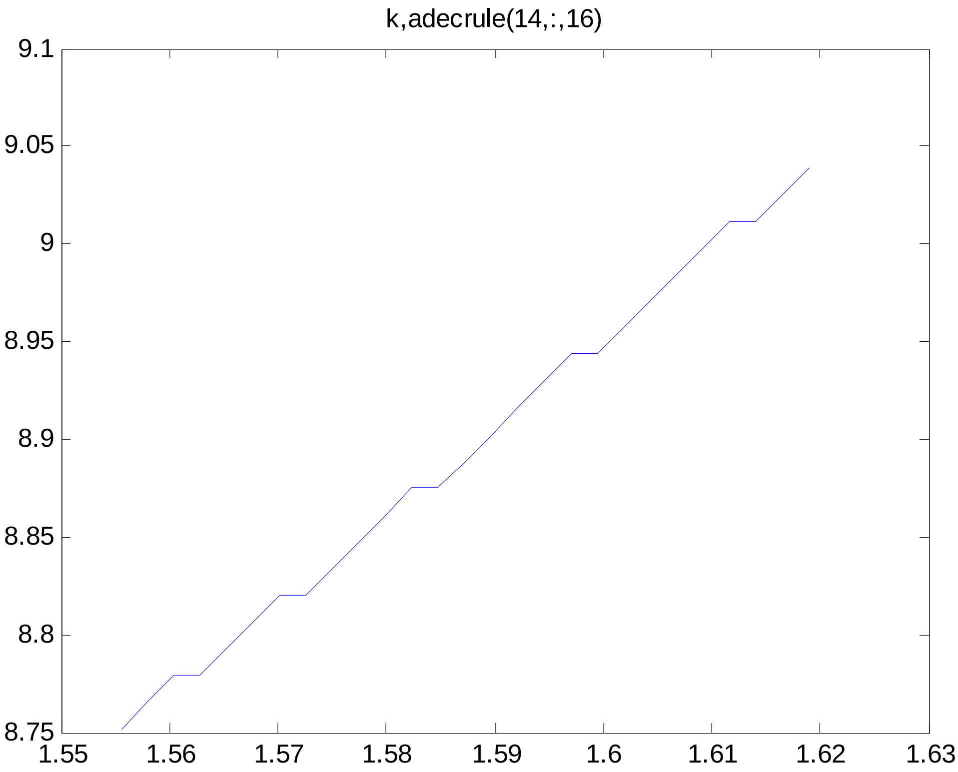
k,adecrule(14,:,16)
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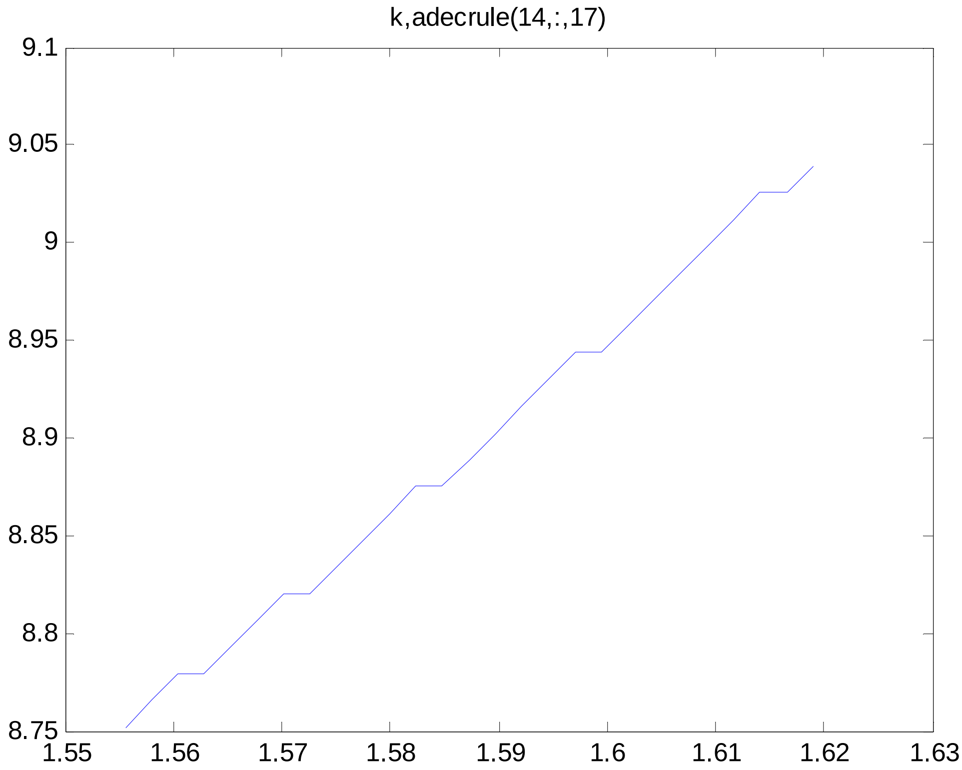
k,adecrule(14,:,17)
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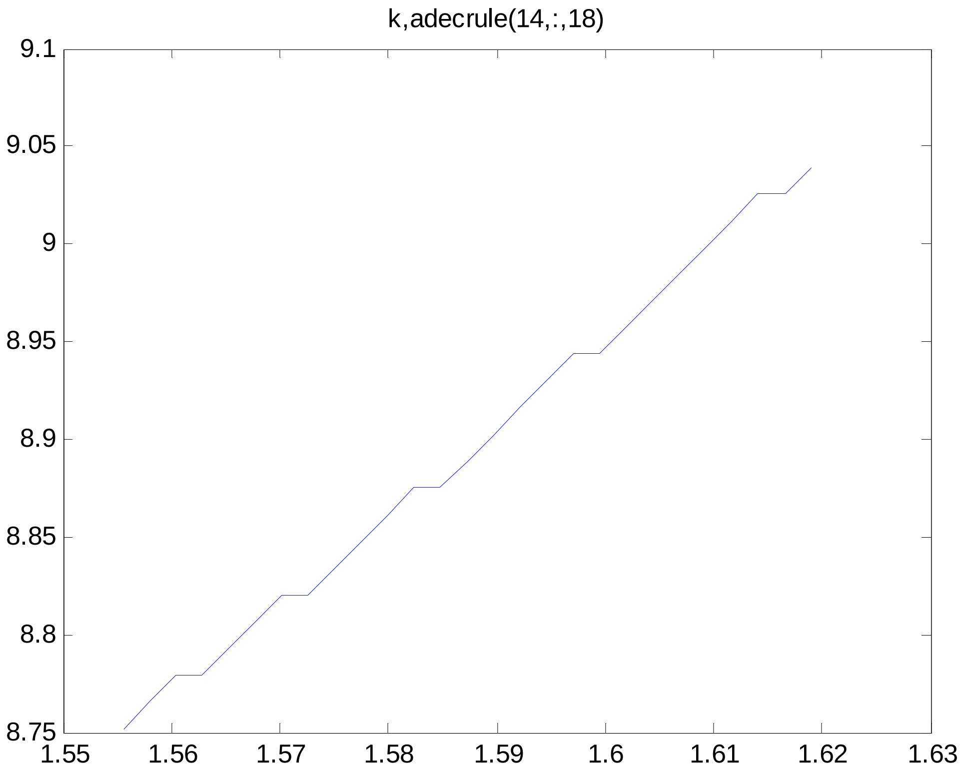
k,adecrule(14,:,18)
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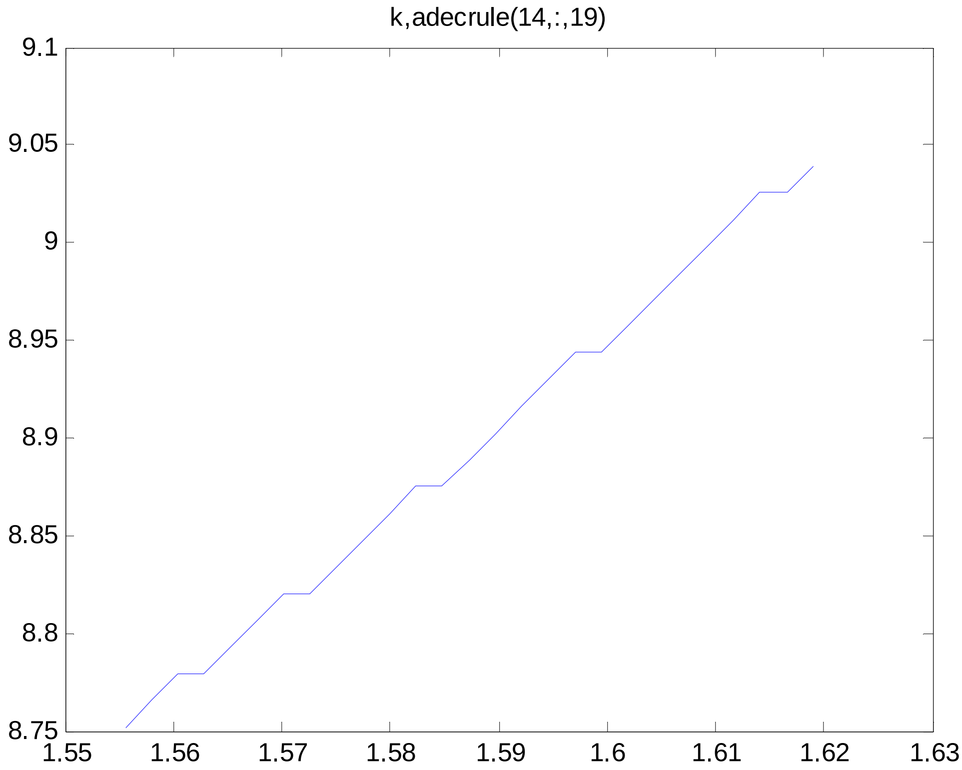
k,adecrule(14,:,19)
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9
8.95
8.9
8.85
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1.58
1.59
1.6
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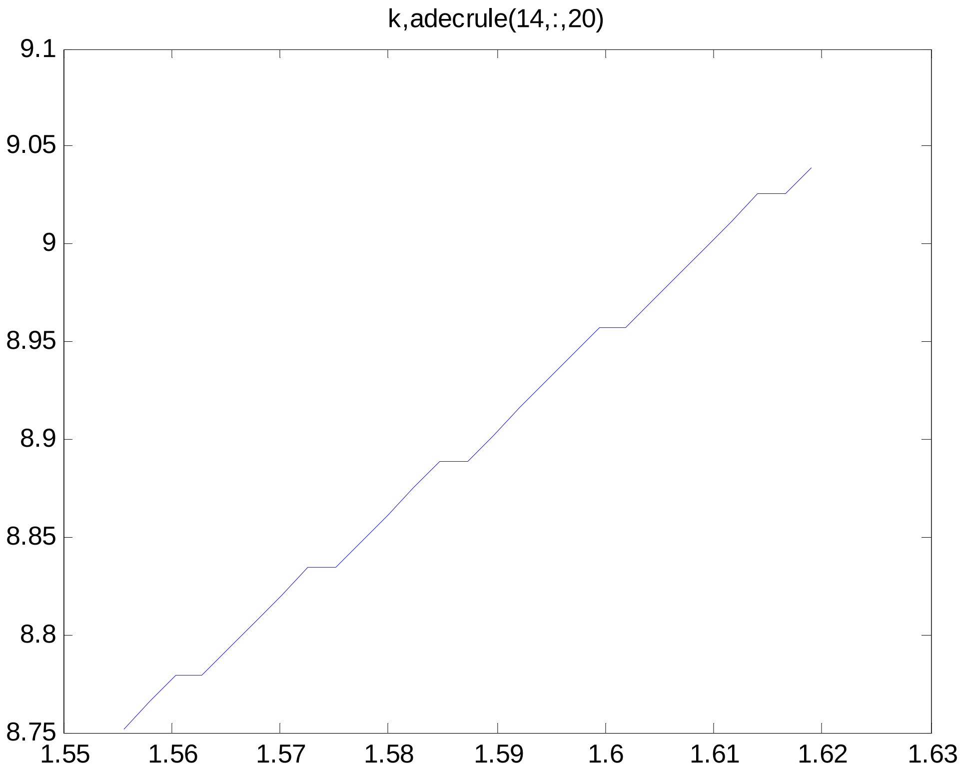
k,adecrule(14,:,20)
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9
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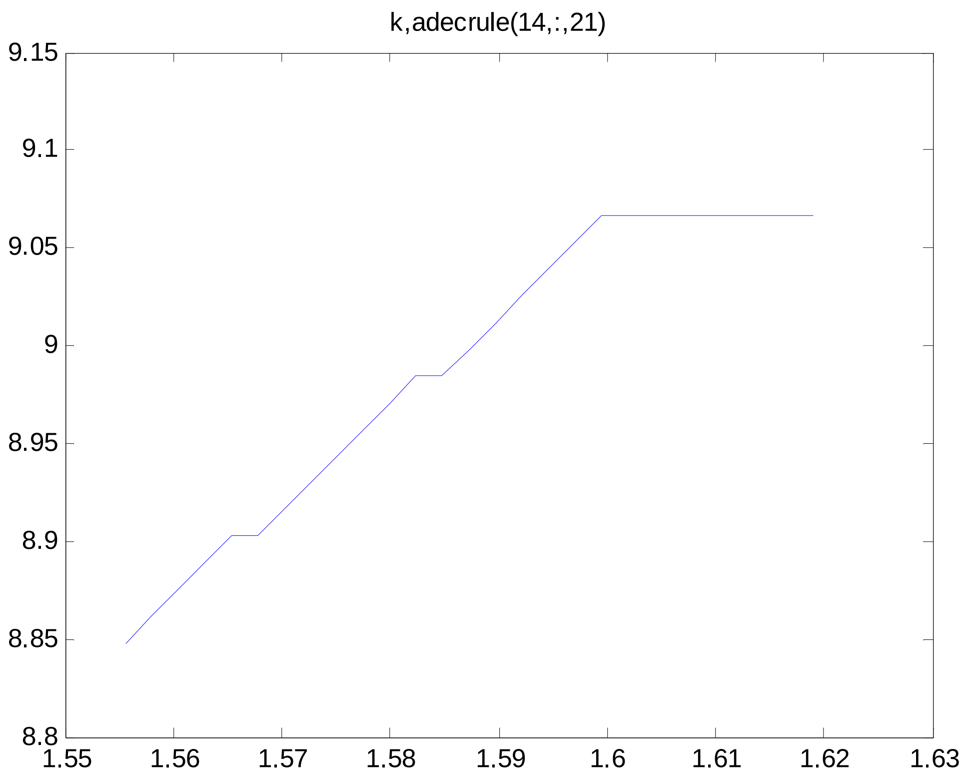
1.62
1.63


k,adecrule(14,:,21)
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1.58
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1.6
1.61
1.62
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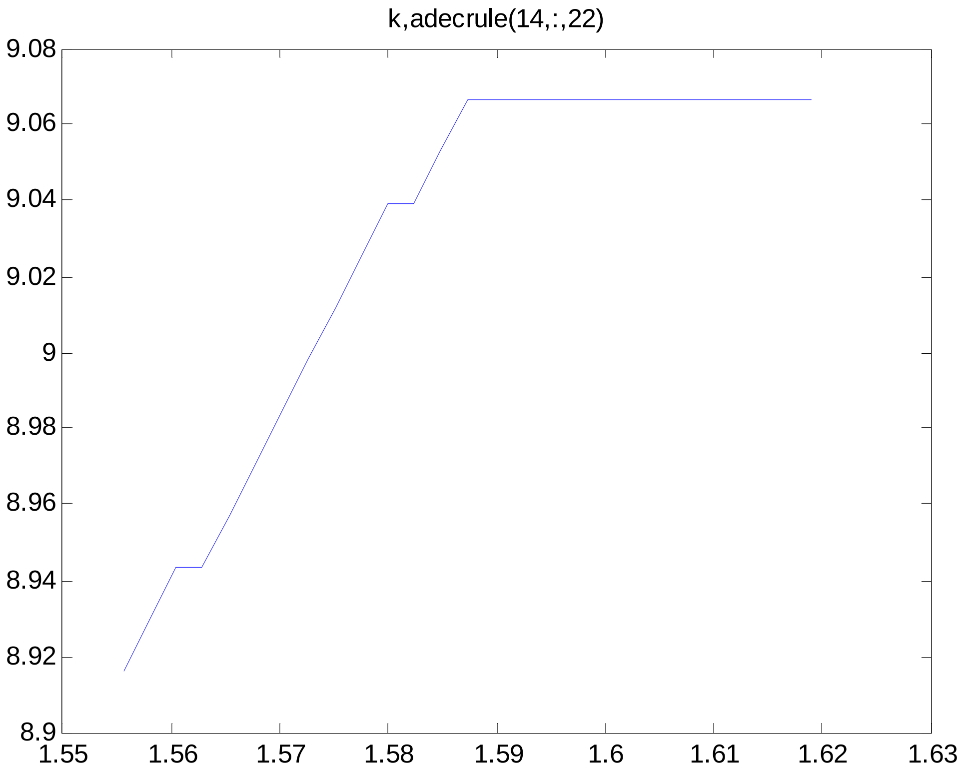
k,adecrule(14,:,22)
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9.02
9
8.98
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1.56
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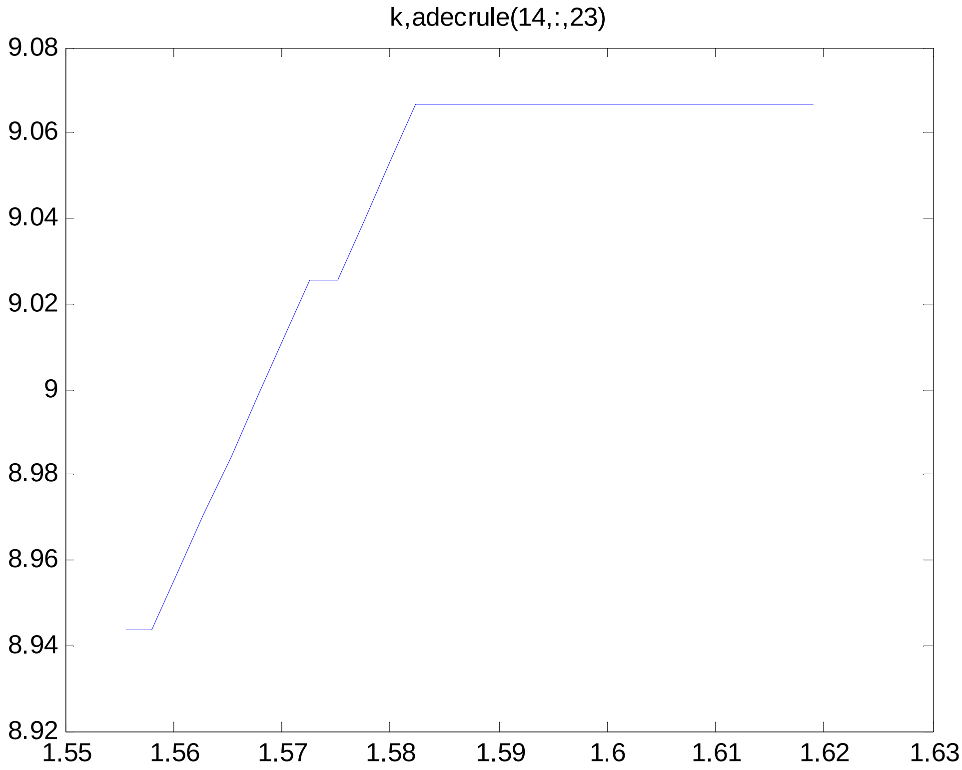
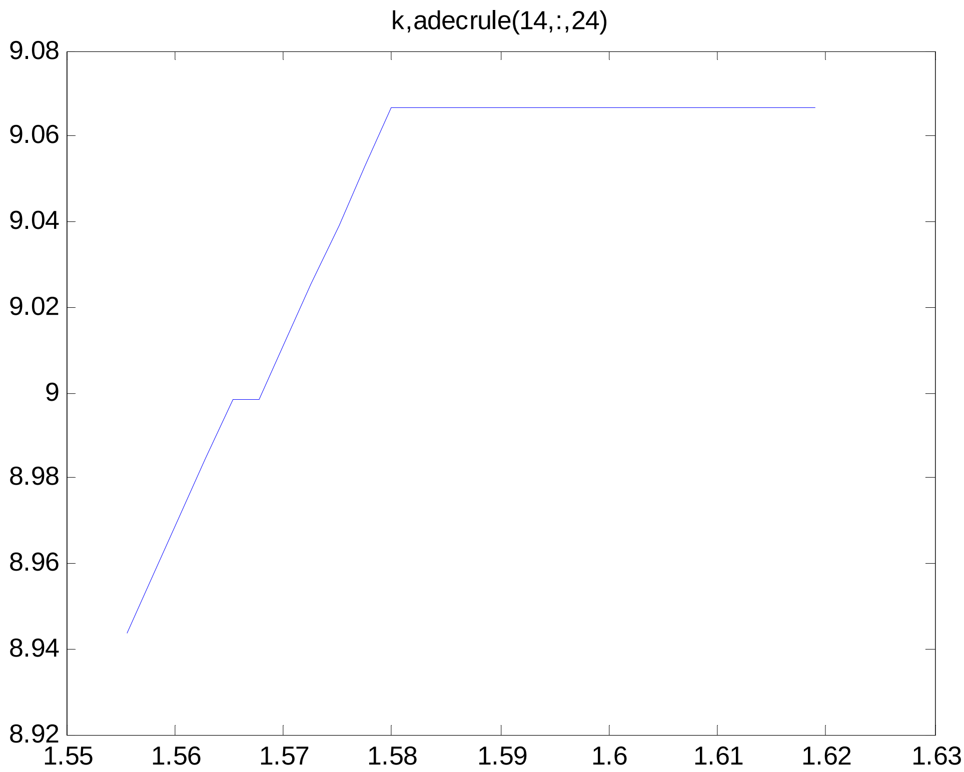
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,23)
9.08
9.06
9.04
9.02
9
8.98
8.96
8.94
8.92
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,24)
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9.06
9.04
9.02
9
8.98
8.96
8.94
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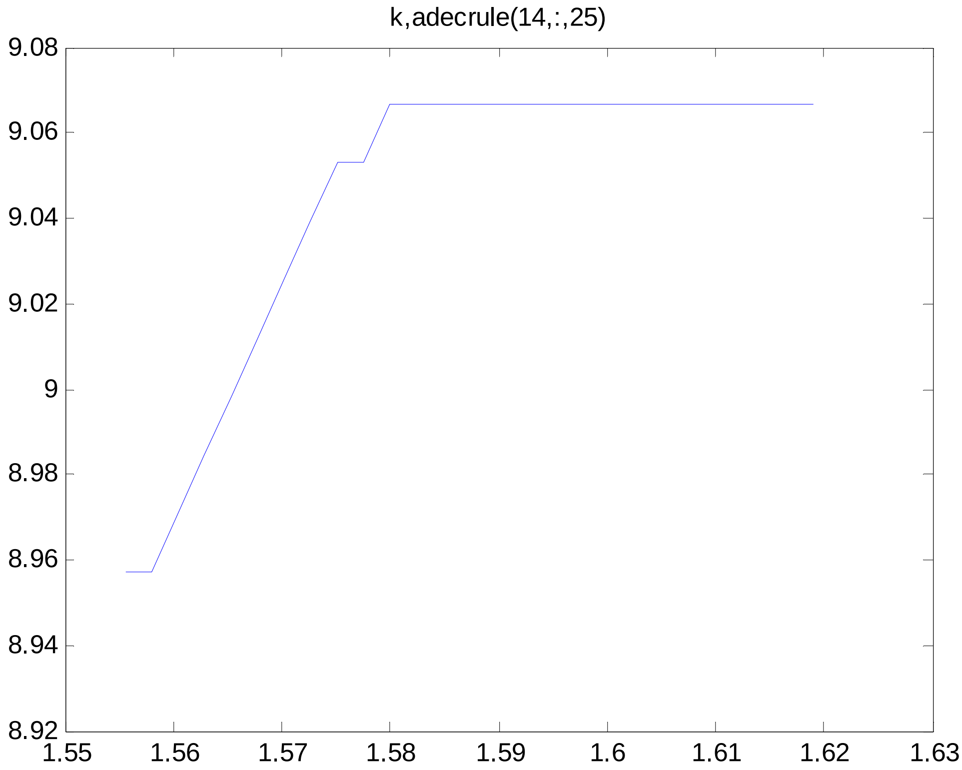
1.61
1.62
1.63


k,adecrule(14,:,25)
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9.04
9.02
9
8.98
8.96
8.94
8.92
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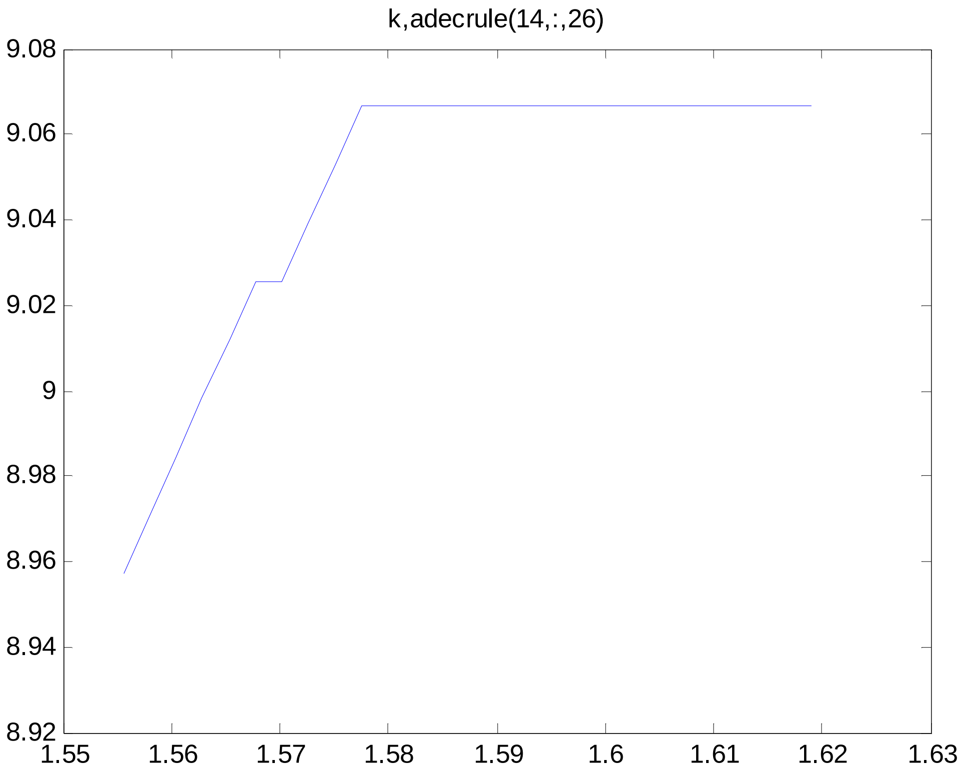
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,adecrule(14,:,26)
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9.04
9.02
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8.98
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8.94
8.92
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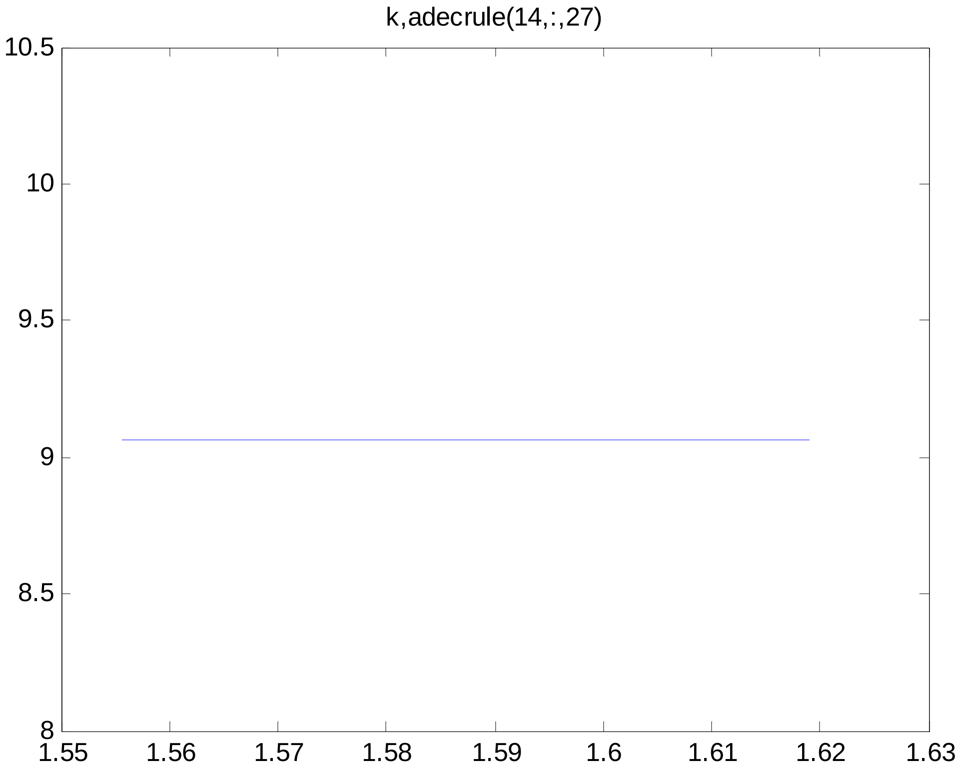
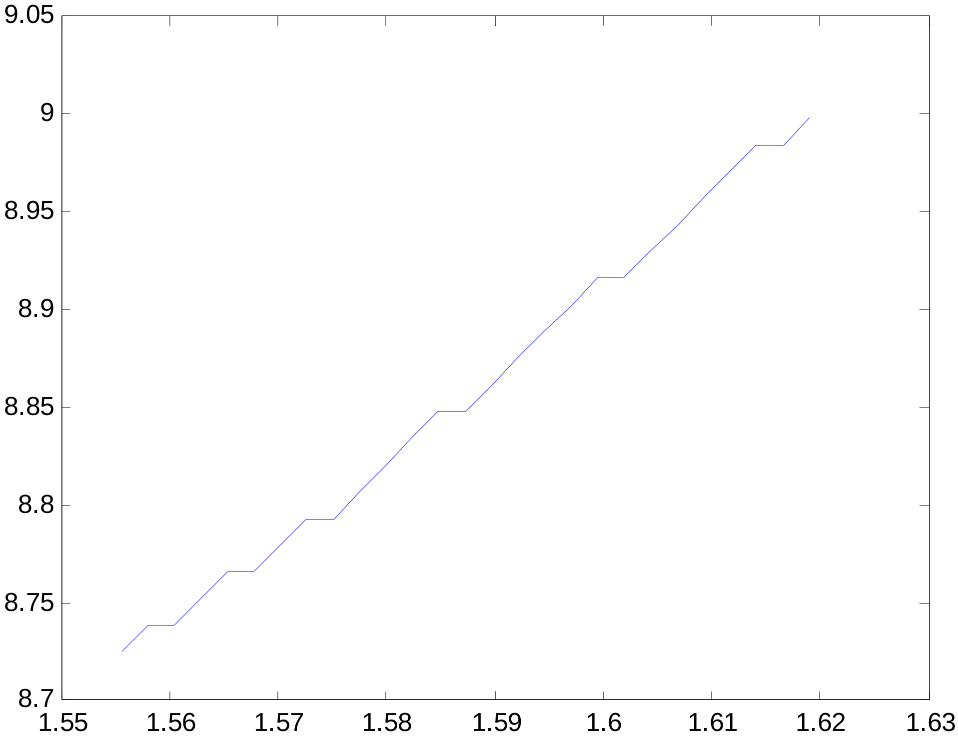
1.61
1.62
1.63

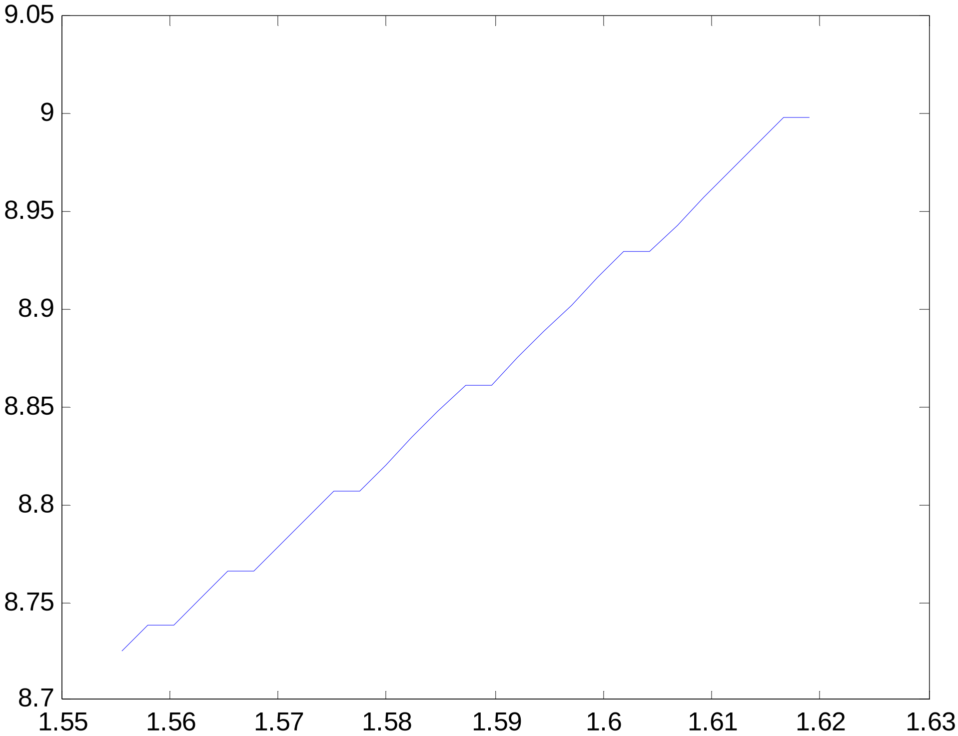

k,adecrule(14,:,27)
10.5
10
9.5
9
8.5
8
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

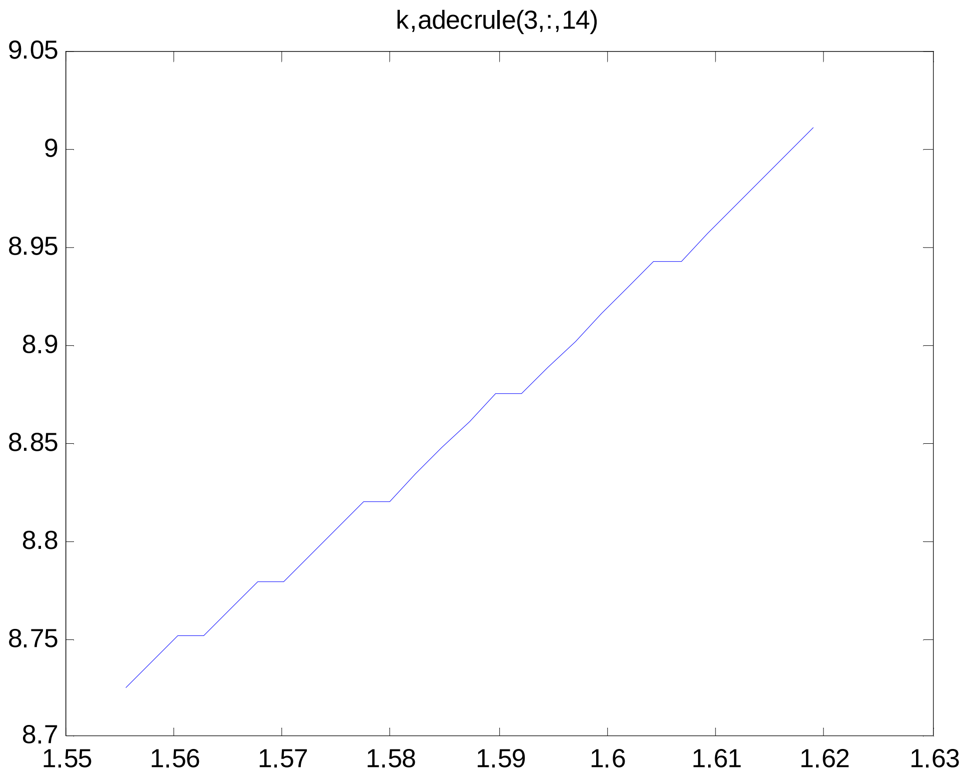
Case_4

k,adecrule(1,:,14)



k,adecrule(2,:,14)




k,adecrule(3,:,14)
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8.8
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8.7
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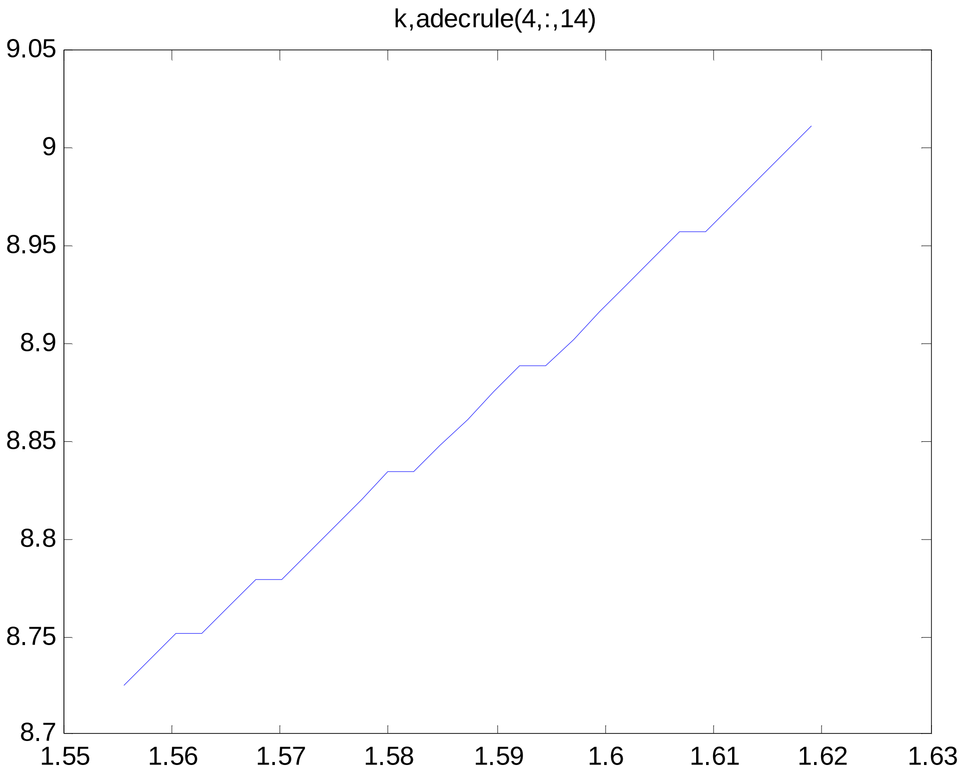
1.61
1.62
1.63


k,adecrule(4,:,14)
9.05
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8.85
8.8
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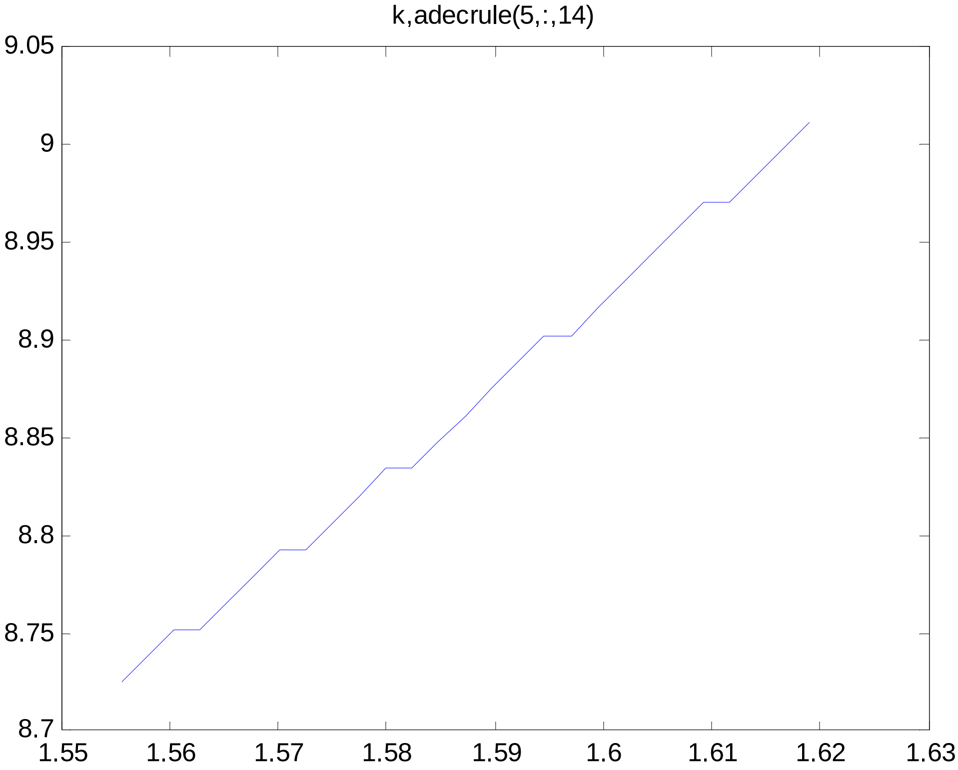
1.61
1.62
1.63


k,adecrule(5,:,14)
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8.9
8.85
8.8
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8.7
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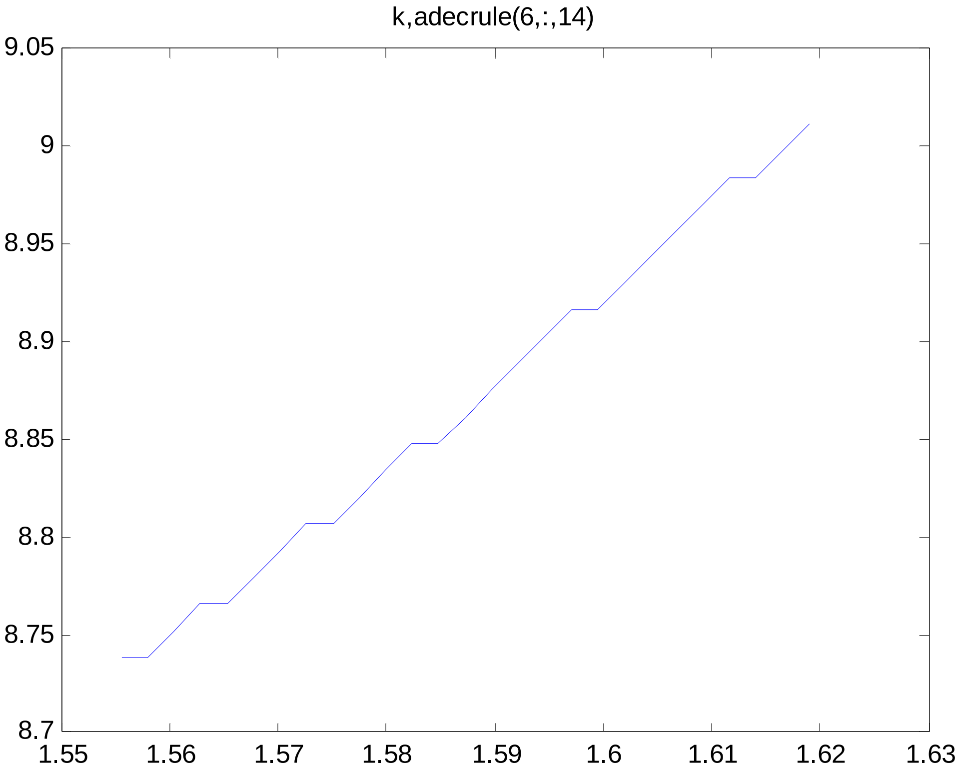
1.61
1.62
1.63


k,adecrule(6,:,14)
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8.95
8.9
8.85
8.8
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8.7
1.55
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1.57
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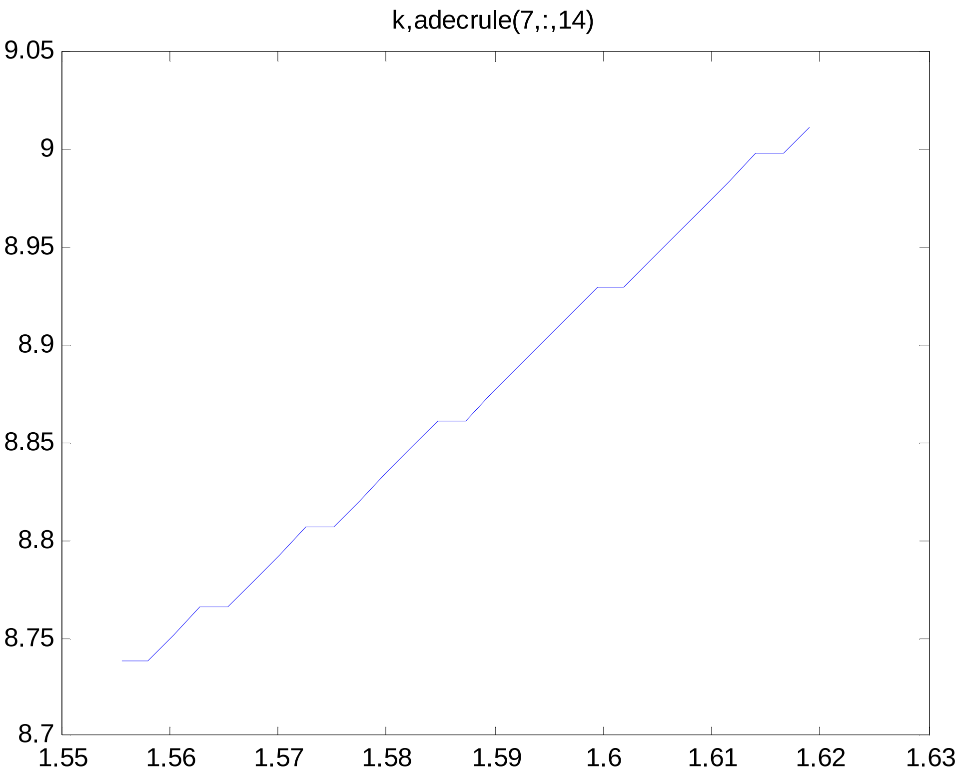
1.59
1.6
1.61
1.62
1.63


k,adecrule(7,:,14)
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8.9
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8.8
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8.7
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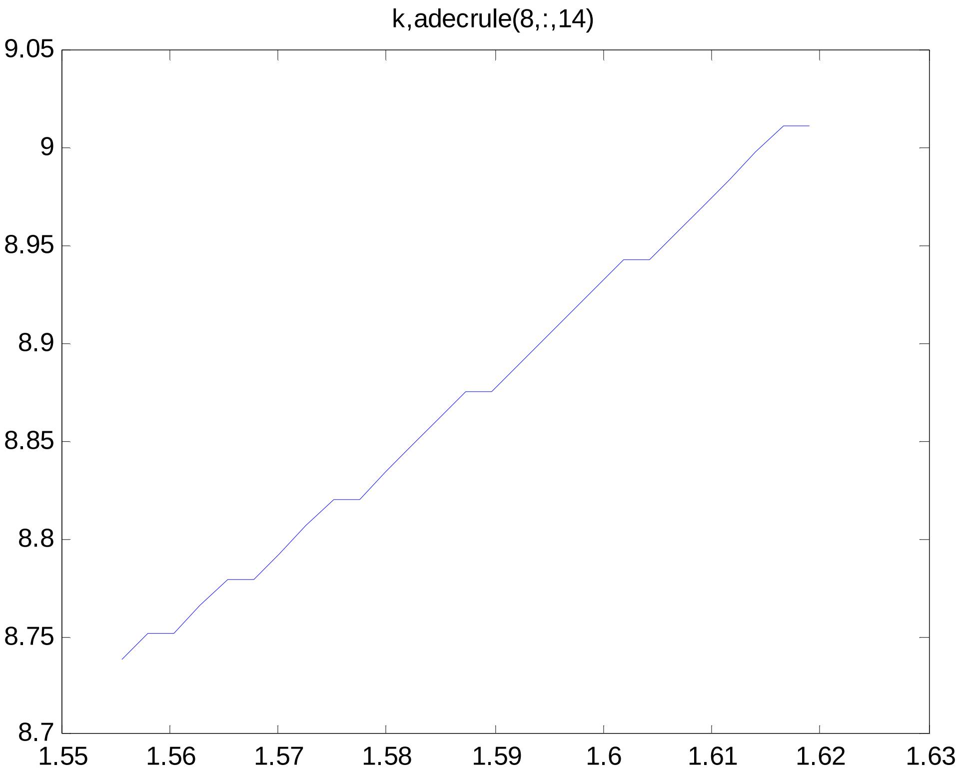
1.62
1.63


k,adecrule(8,:,14)
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9
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8.9
8.85
8.8
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8.7
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1.57
1.58
1.59
1.6
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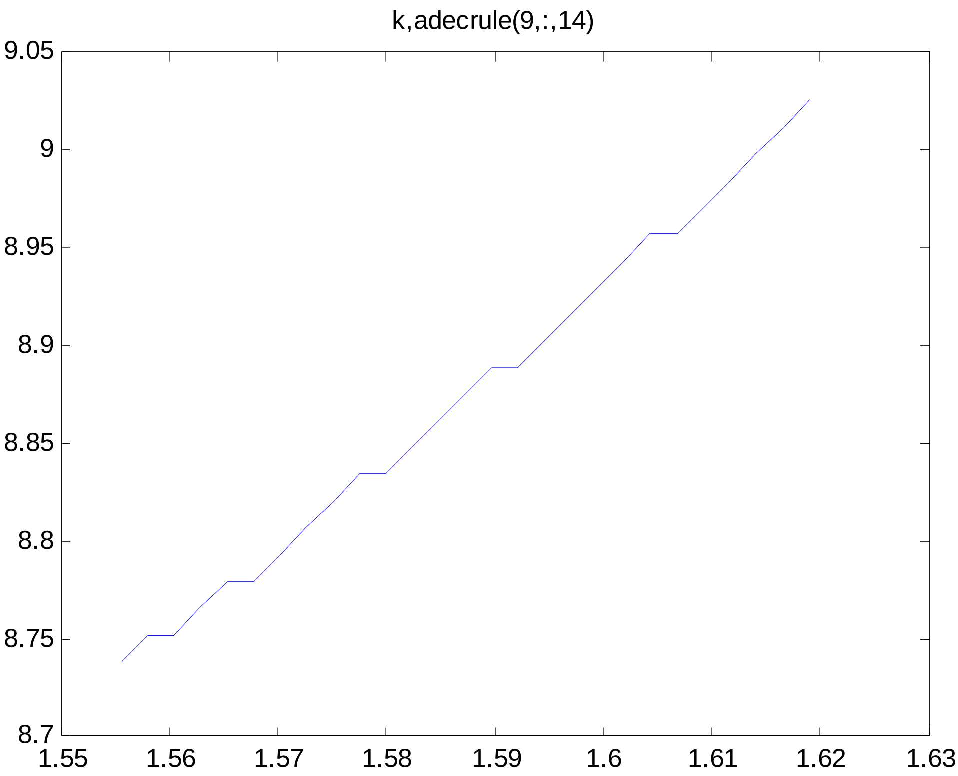
1.62
1.63


k,adecrule(9,:,14)
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8.95
8.9
8.85
8.8
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8.7
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1.57
1.58
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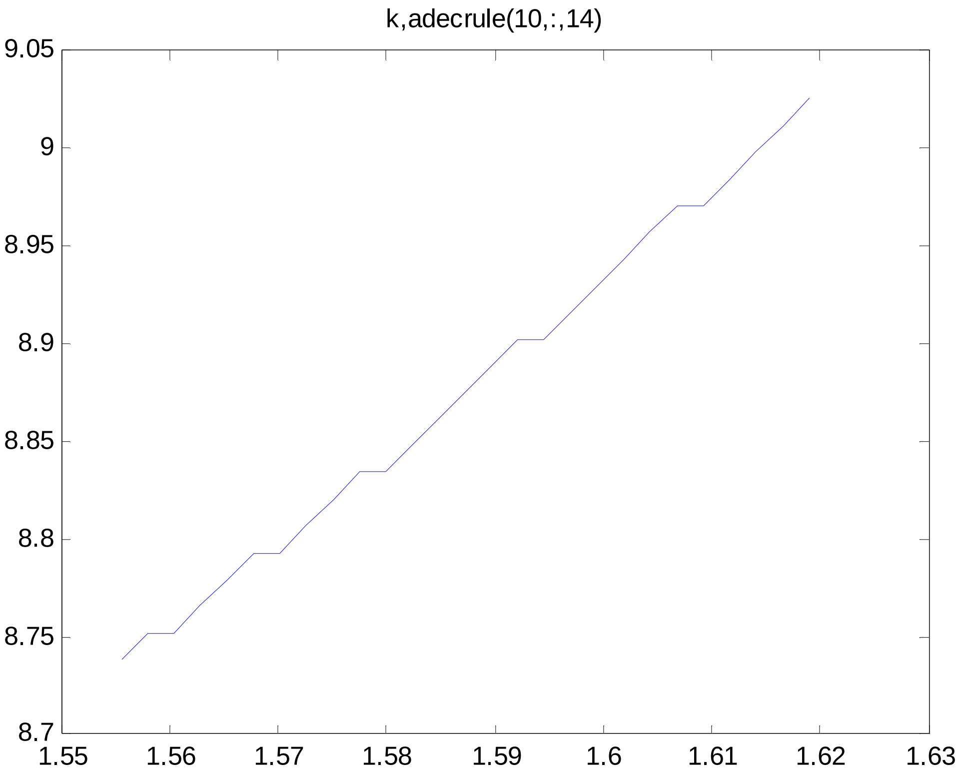
k,adecrule(10,:,14)
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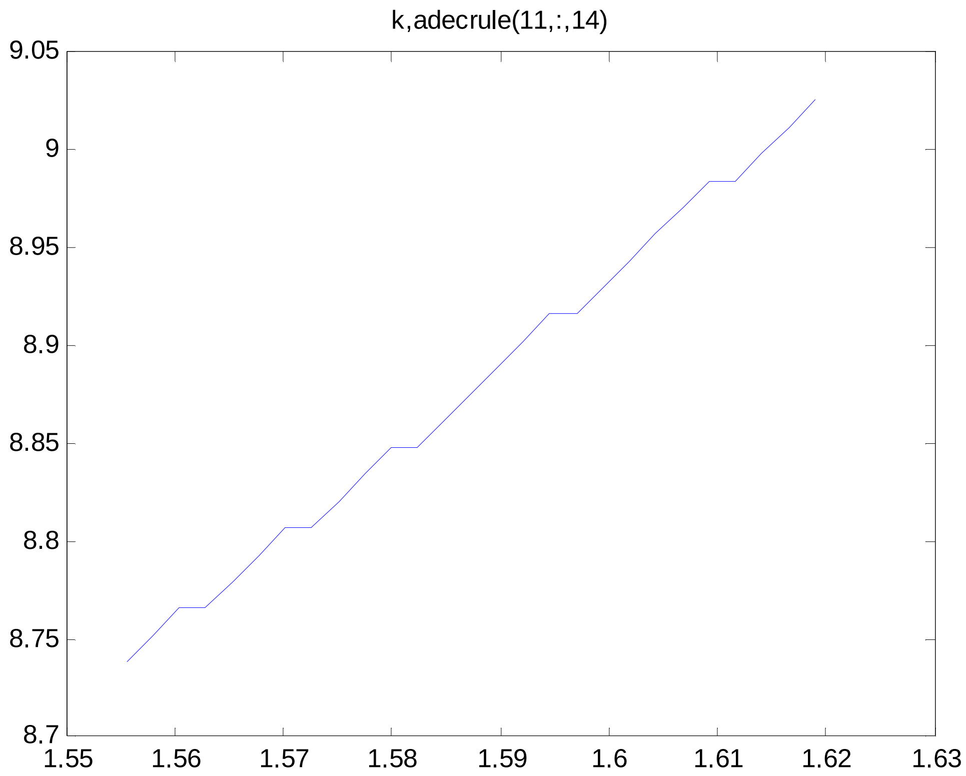
k,adecrule(11,:,14)
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8.9
8.85
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1.57
1.58
1.59
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1.62
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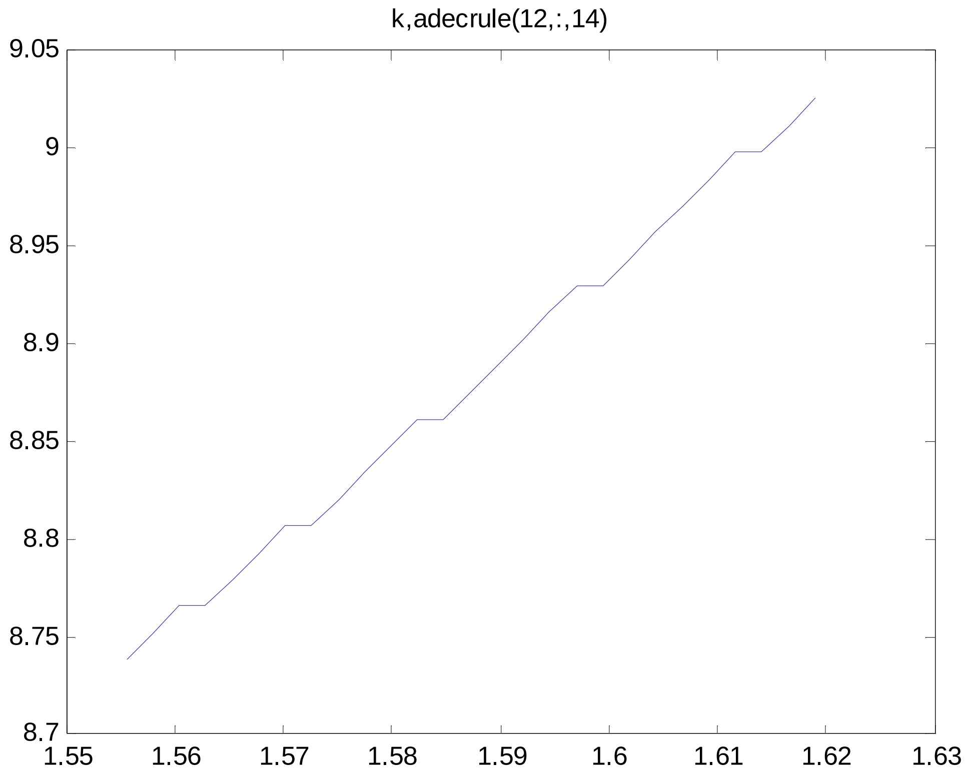
k,adecrule(12,:,14)
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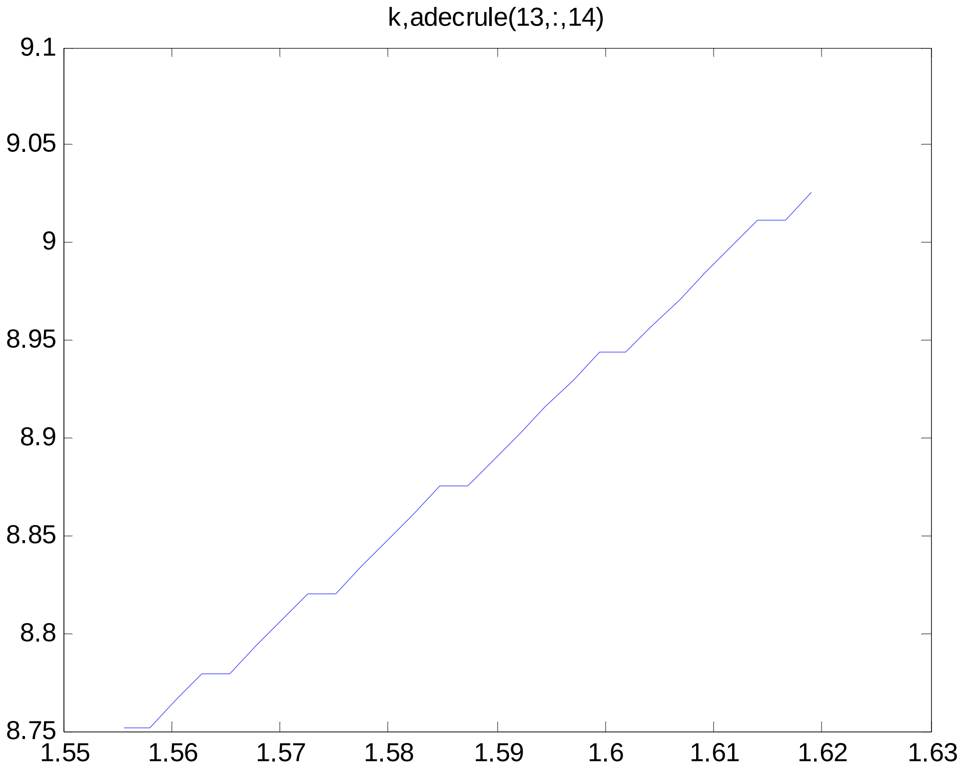
k,adecrule(13,:,14)
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9
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8.9
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1.57
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1.59
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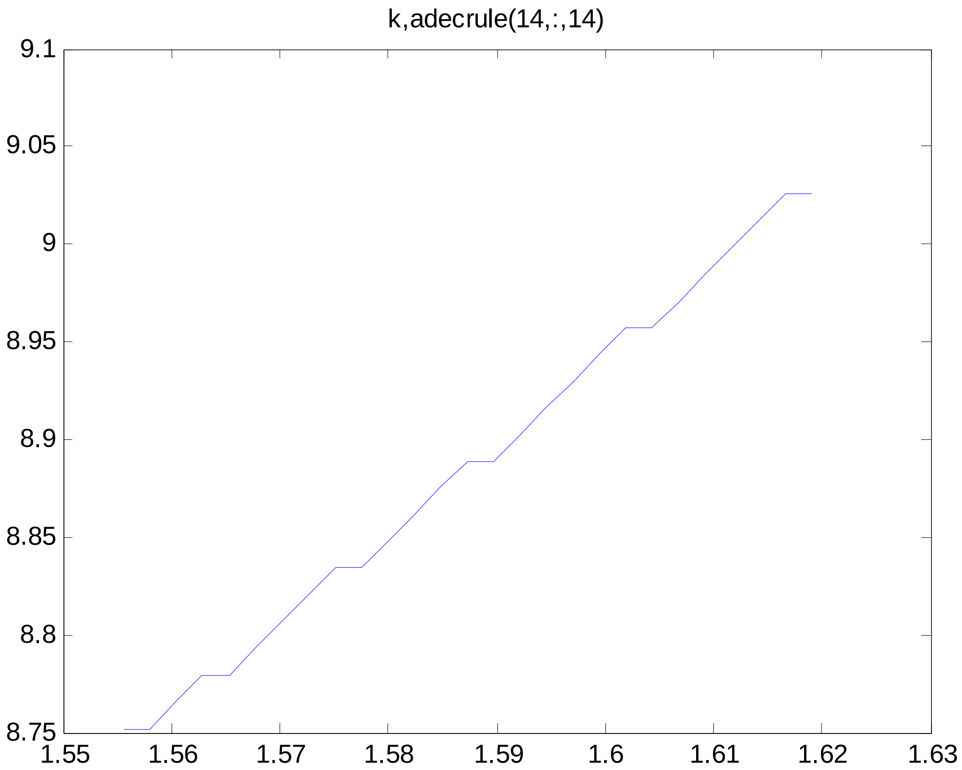
1.61
1.62
1.63


k,adecrule(14,:,14)
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8.9
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8.75
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1.61
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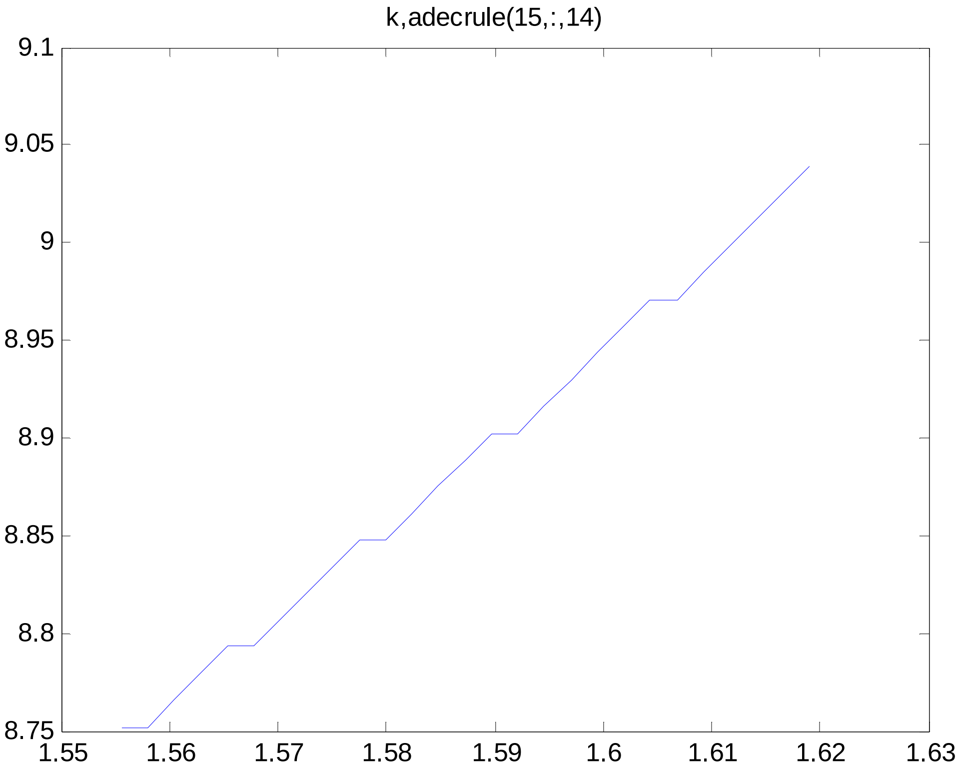
1.63


k,adecrule(15,:,14)
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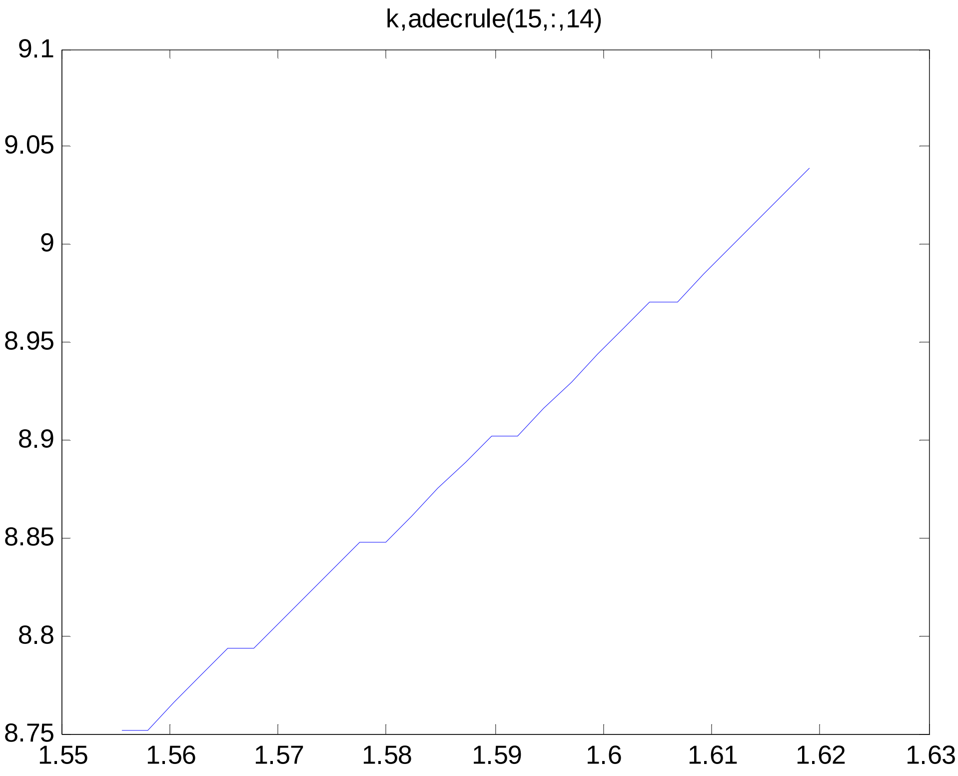
1.62
1.63


k,adecrule(15,:,14)
9.1
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9
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8.9
8.85
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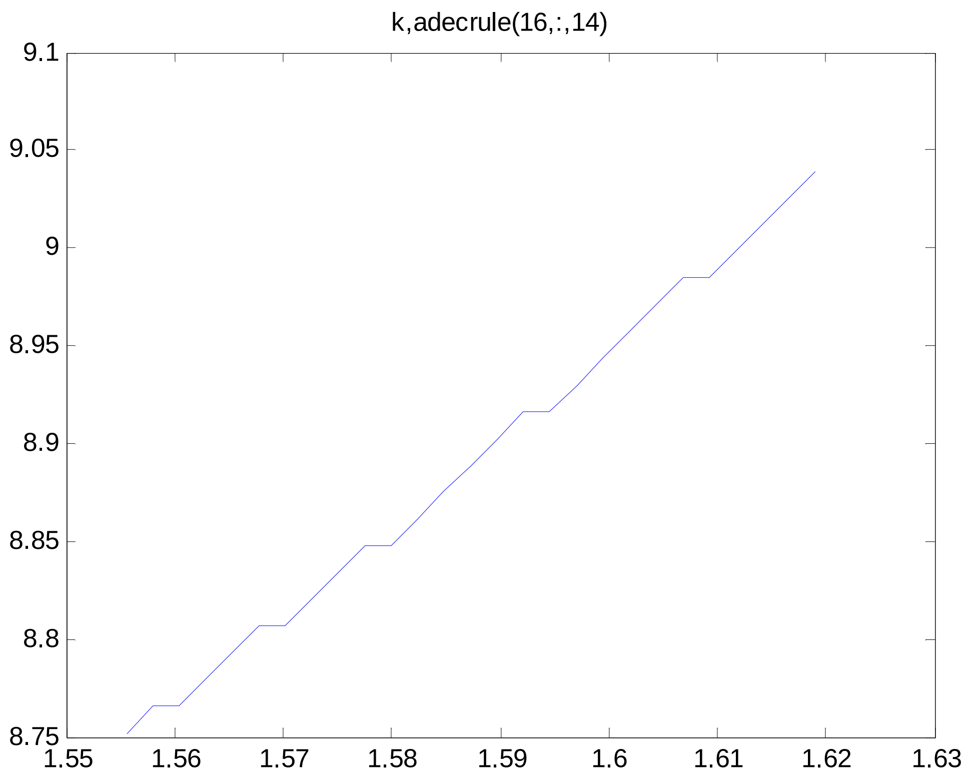
1.61
1.62
1.63


k,adecrule(16,:,14)
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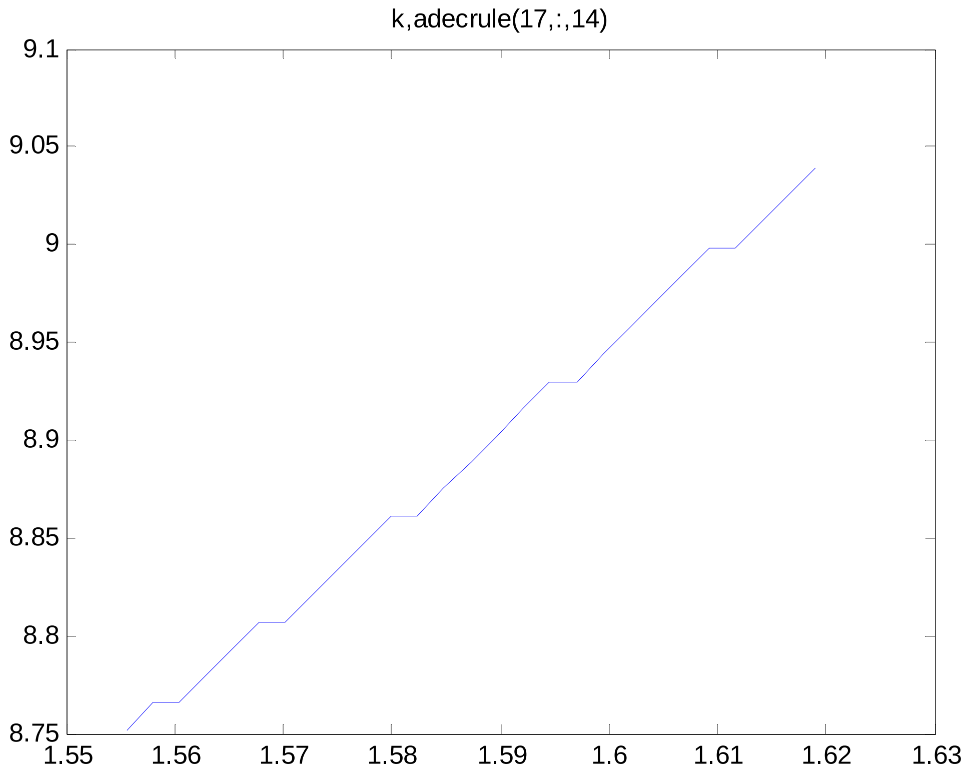
1.62
1.63


k,adecrule(17,:,14)
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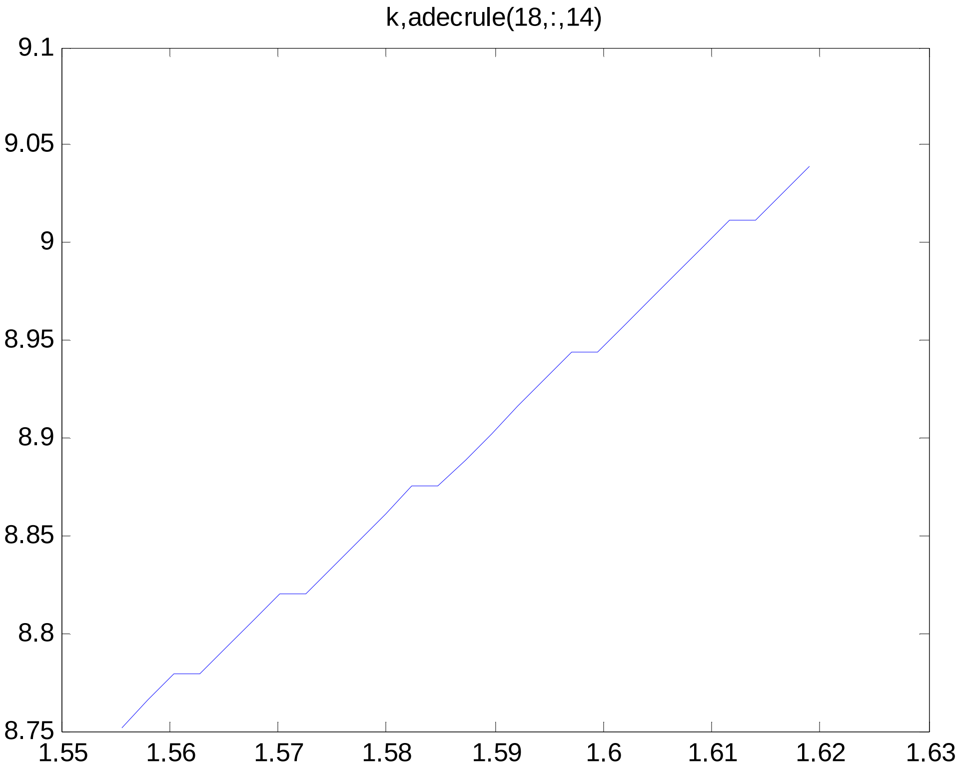
1.61
1.62
1.63


k,adecrule(18,:,14)
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9
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8.9
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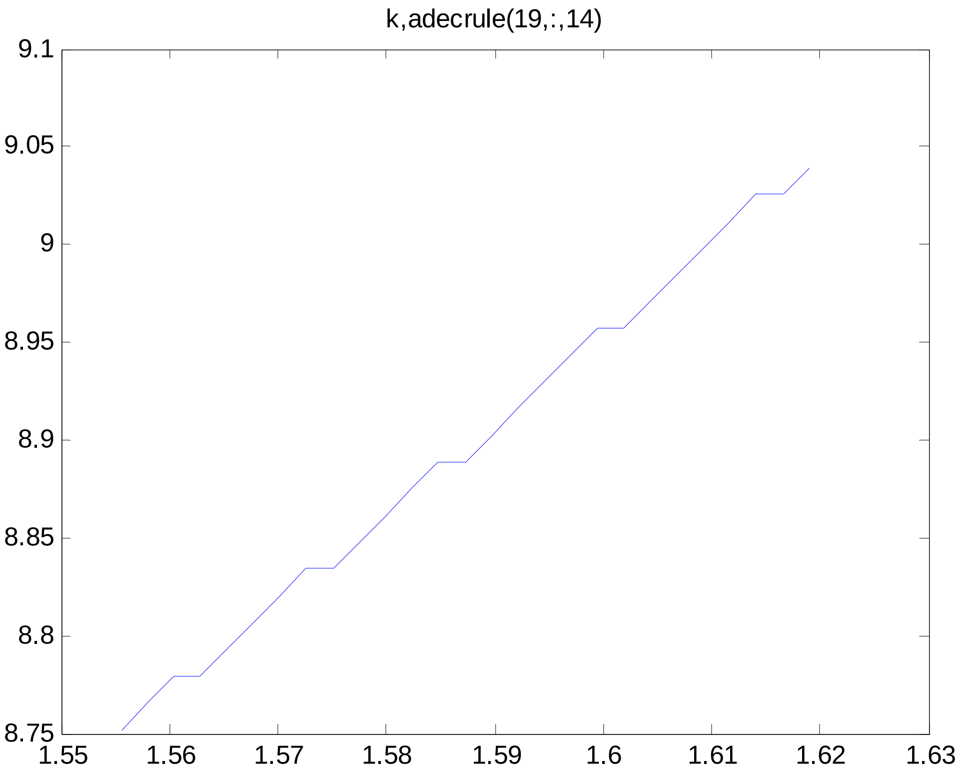
1.61
1.62
1.63


k,adecrule(19,:,14)
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9
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8.9
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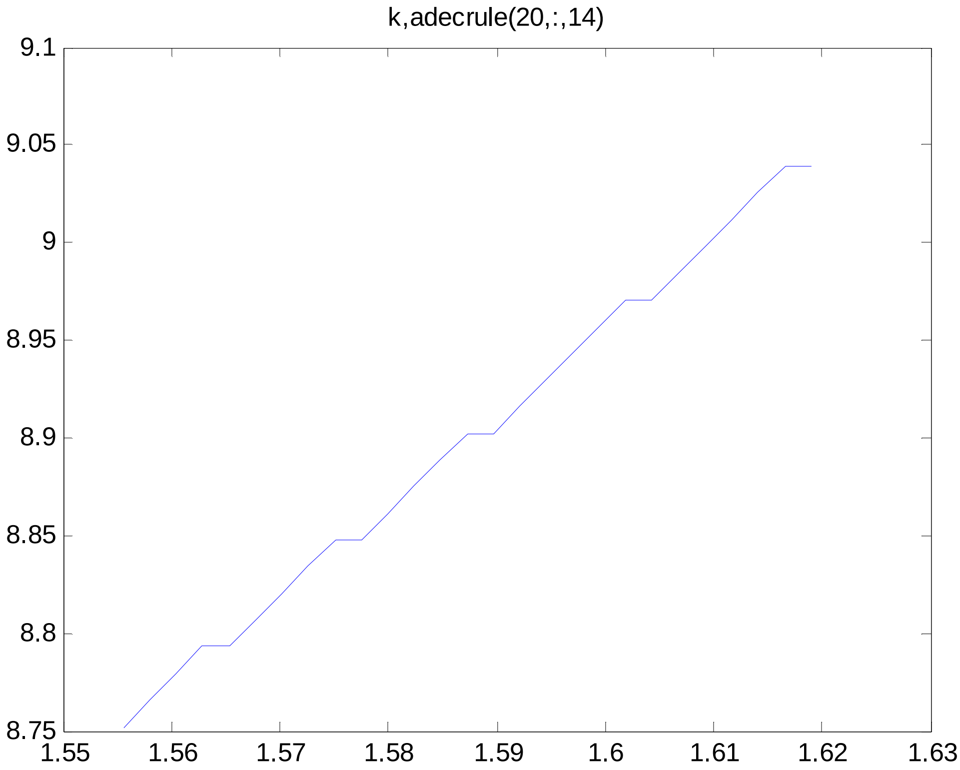
1.61
1.62
1.63


k,adecrule(20,:,14)
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9
8.95
8.9
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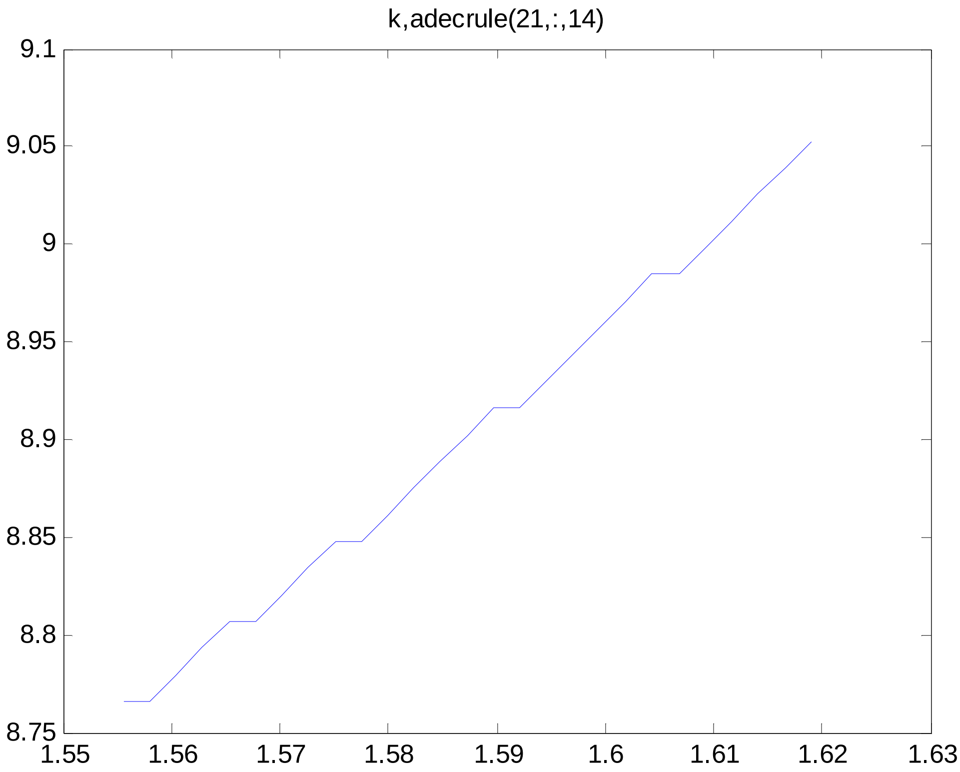
1.61
1.62
1.63


k,adecrule(21,:,14)
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9
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8.9
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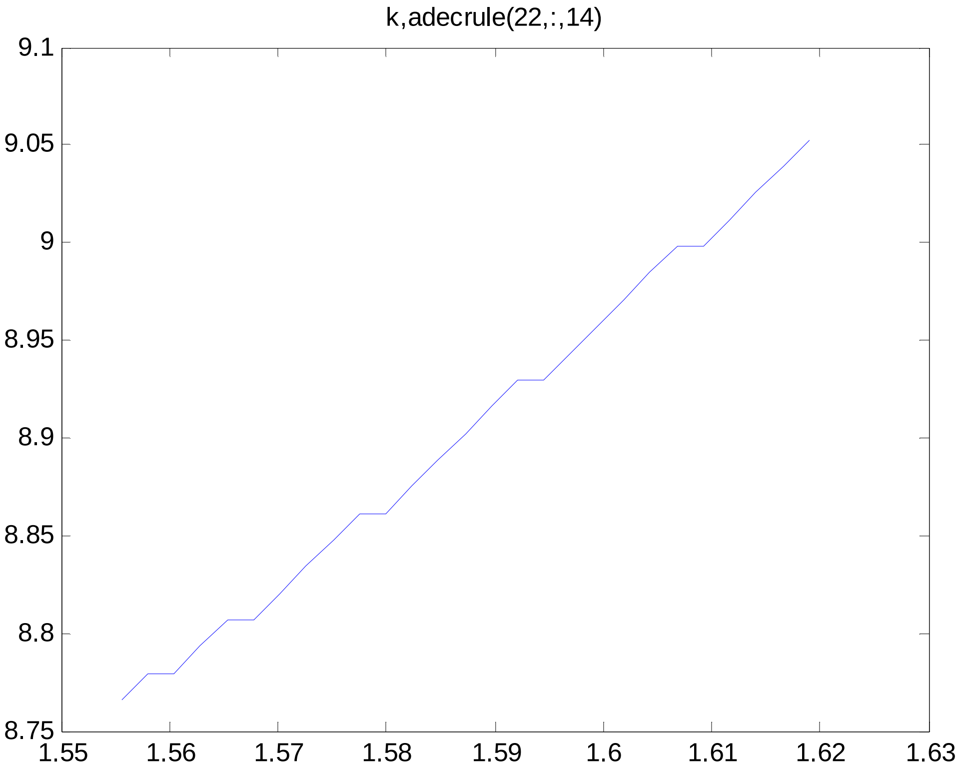
1.61
1.62
1.63


k,adecrule(22,:,14)
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9
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8.9
8.85
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8.75
1.55
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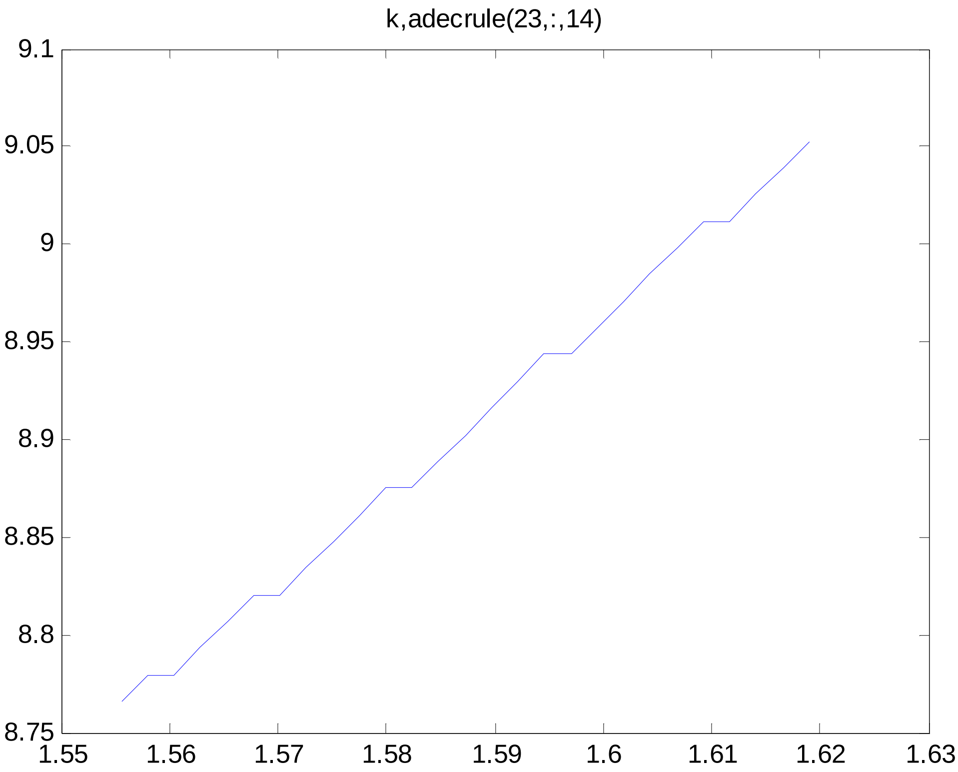
1.59
1.6
1.61
1.62
1.63


k,adecrule(23,:,14)
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9.05
9
8.95
8.9
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8.75
1.55
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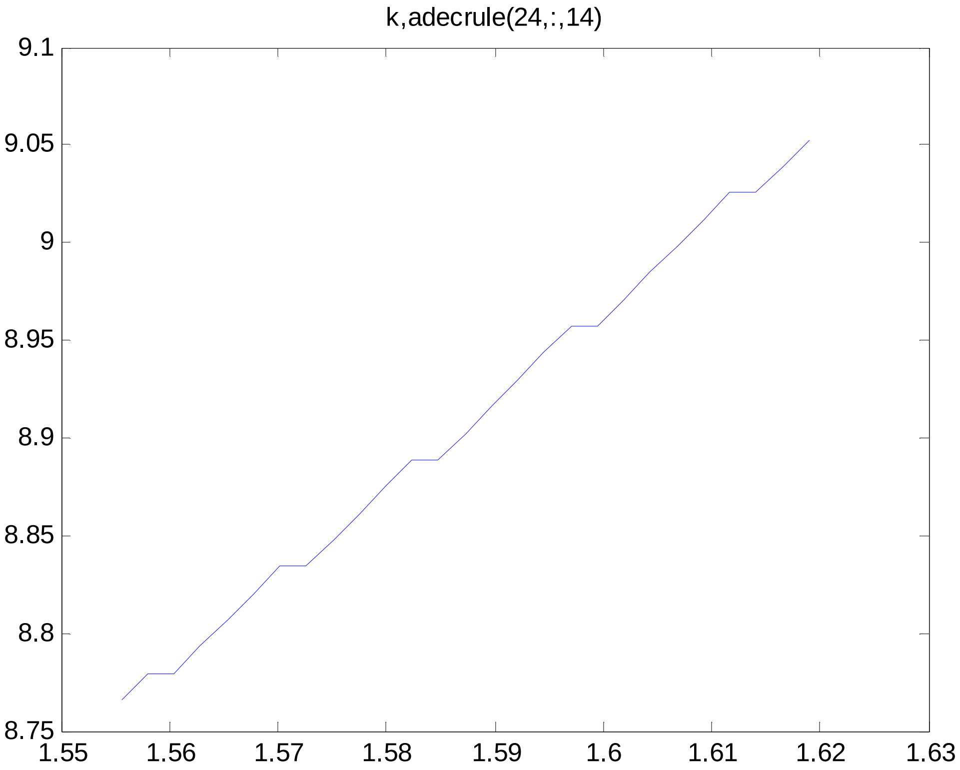
1.61
1.62
1.63


k,adecrule(24,:,14)
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9
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8.9
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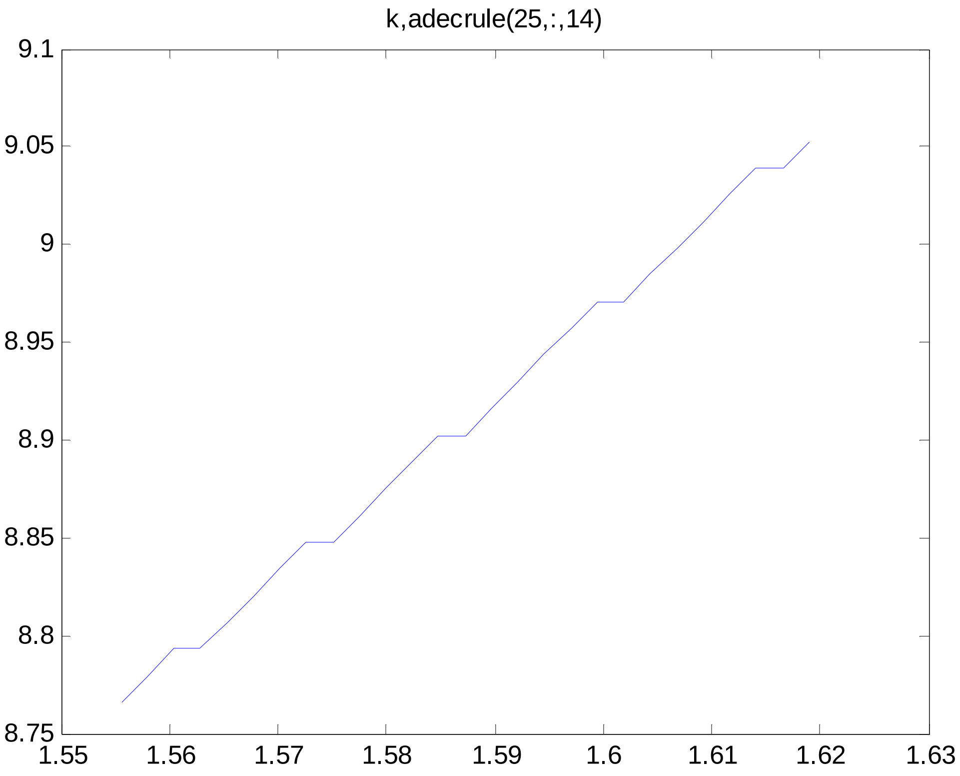
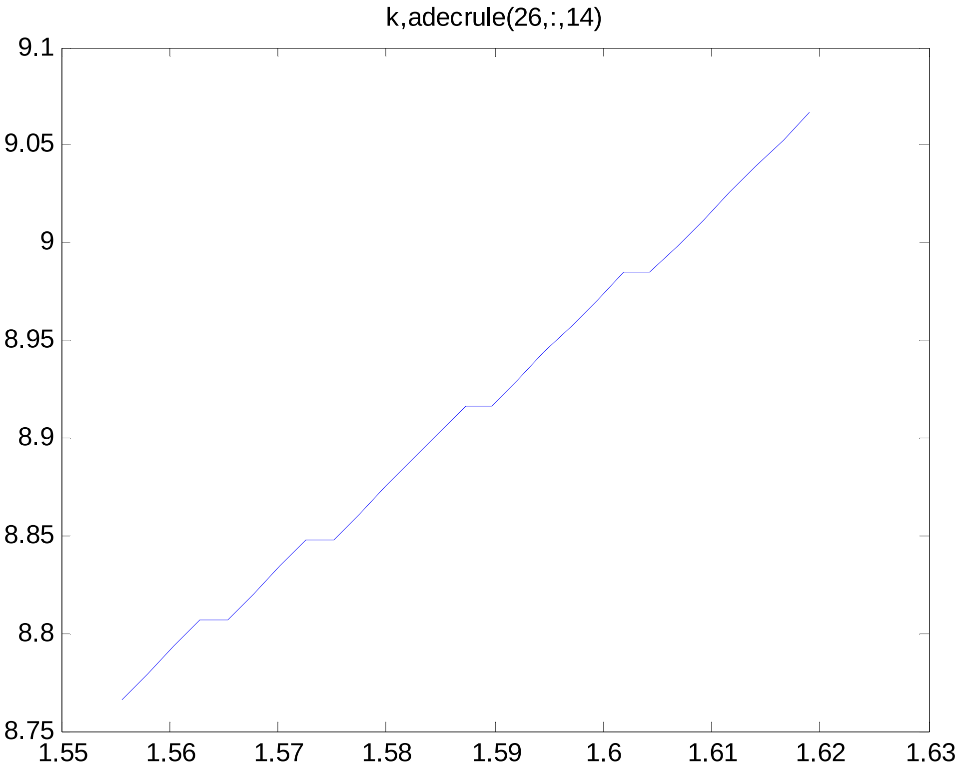
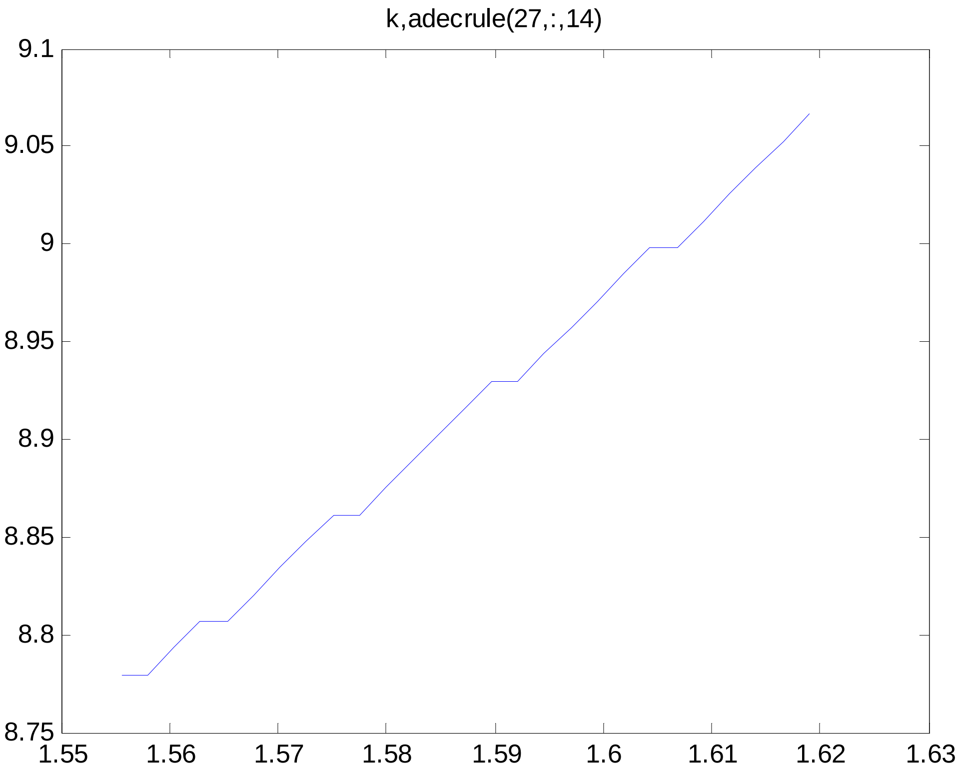
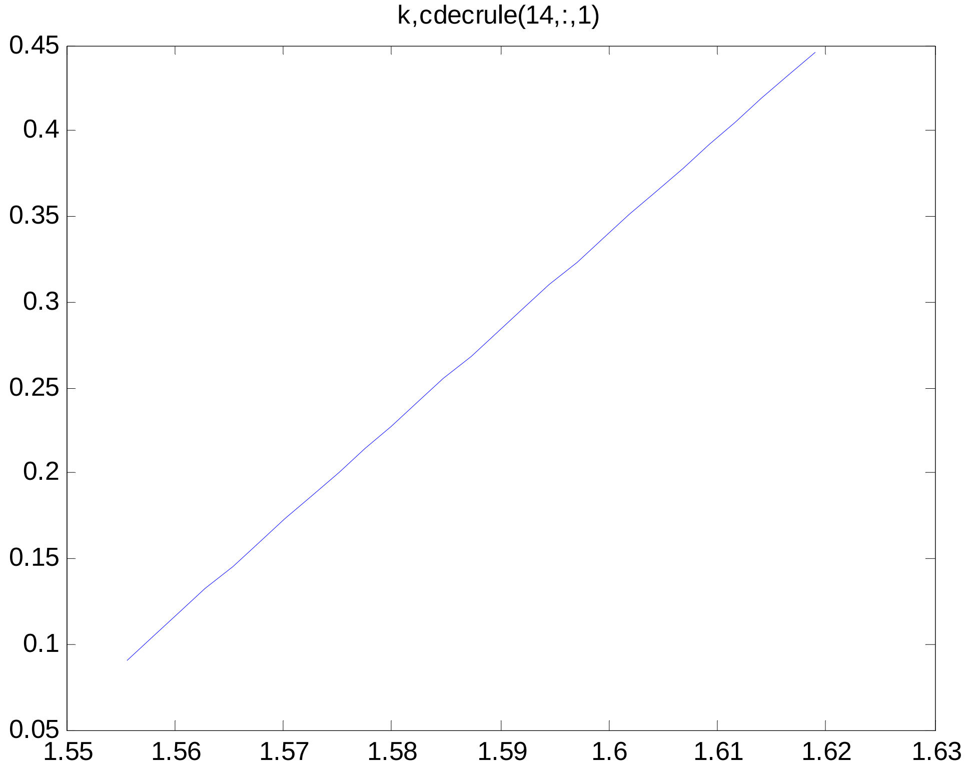
8.8
8.75
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

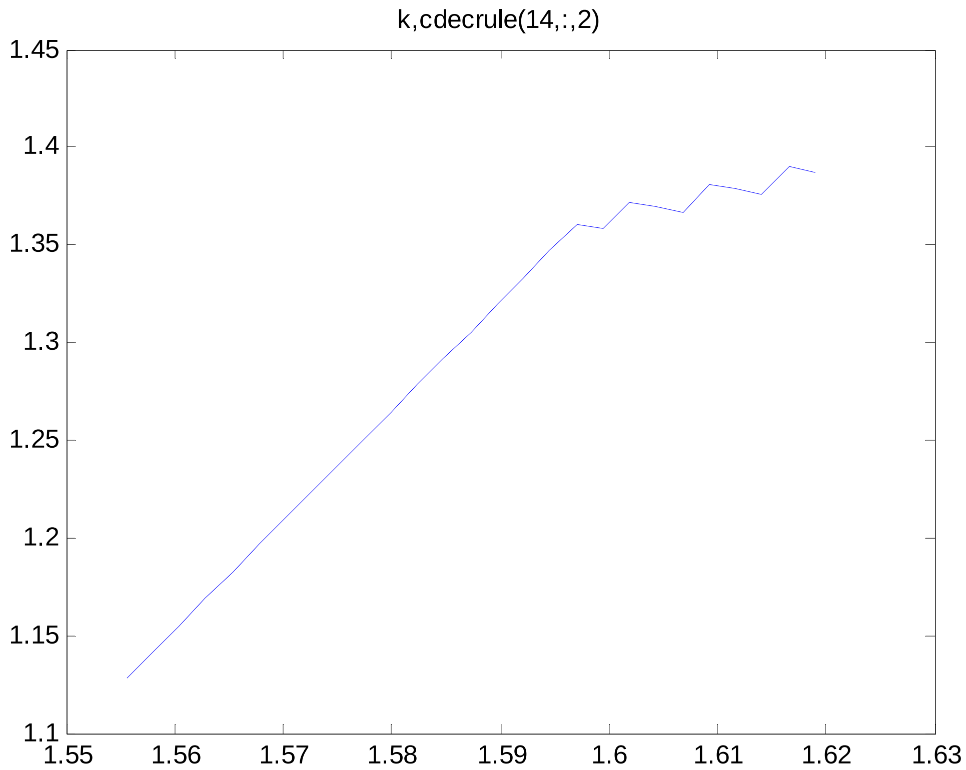

k,adecrule(25,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

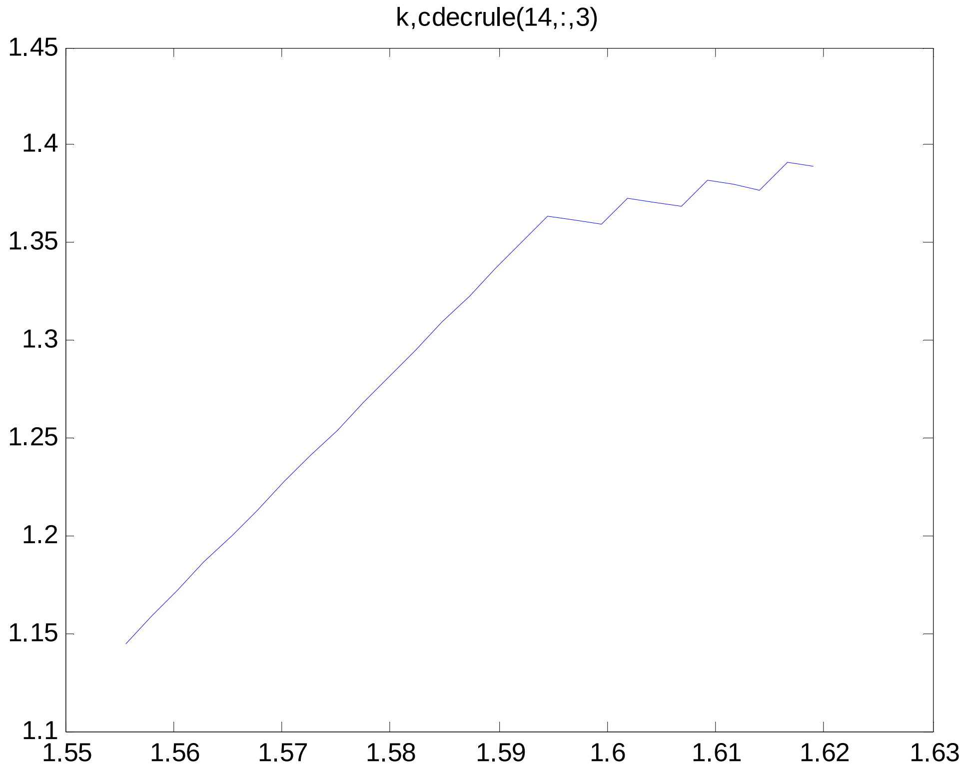

k,adecrule(26,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

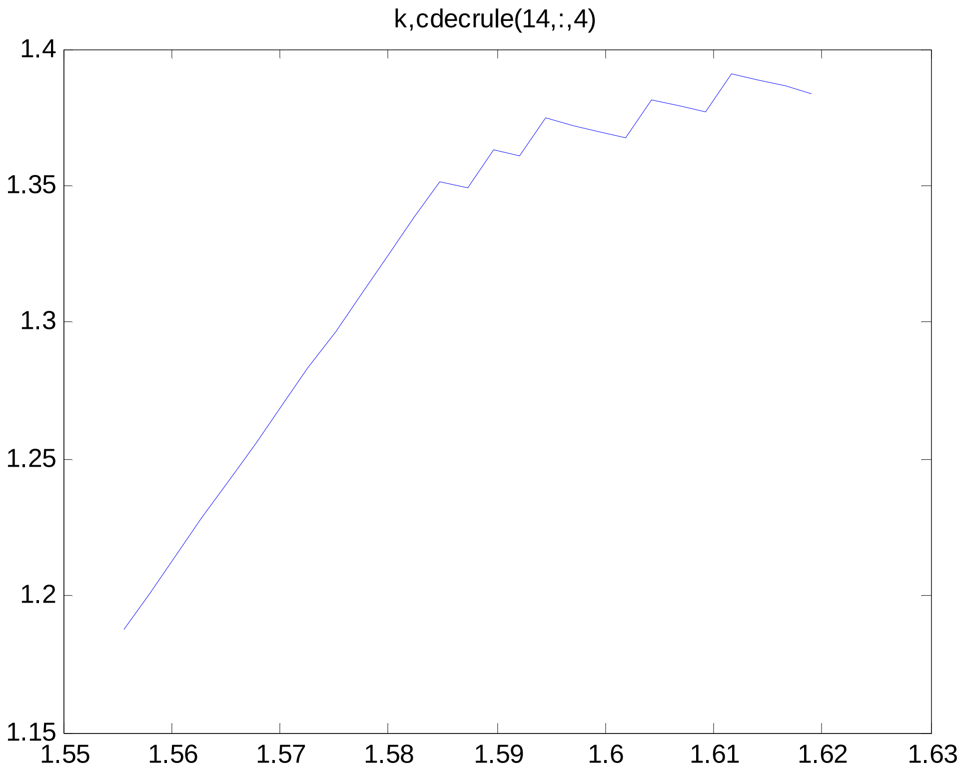

k,adecrule(27,:,14)
9.1
9.05
9
8.95
8.9
8.85
8.8
8.75
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

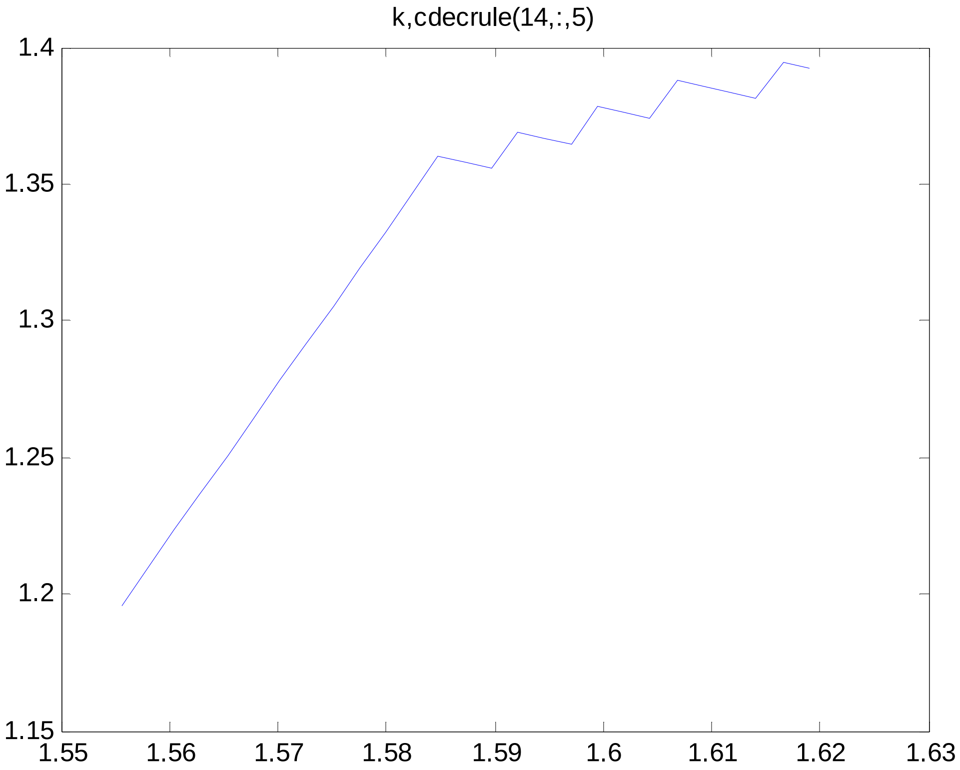
Case_5

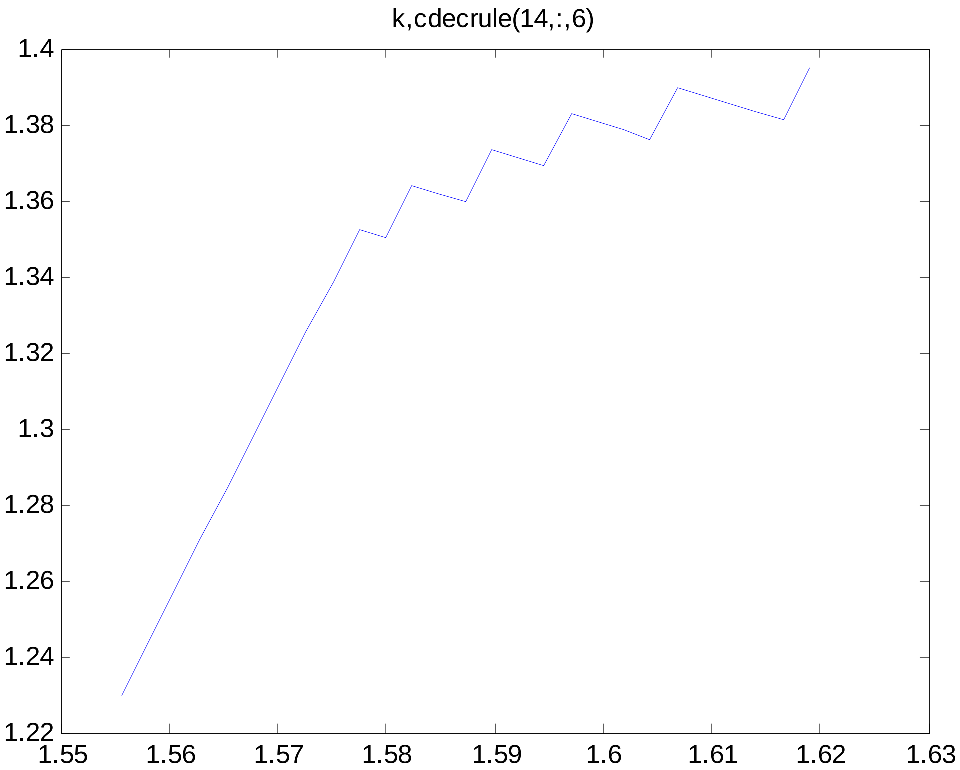

k,cdecrule(14,:,1)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

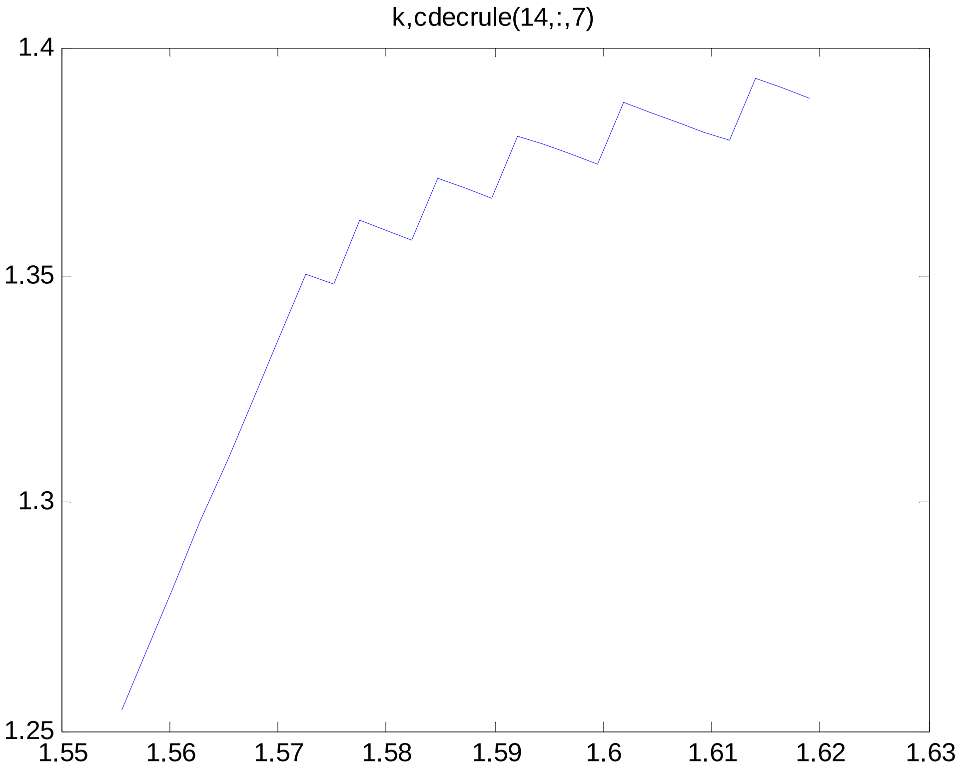

k,cdecrule(14,:,2)
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

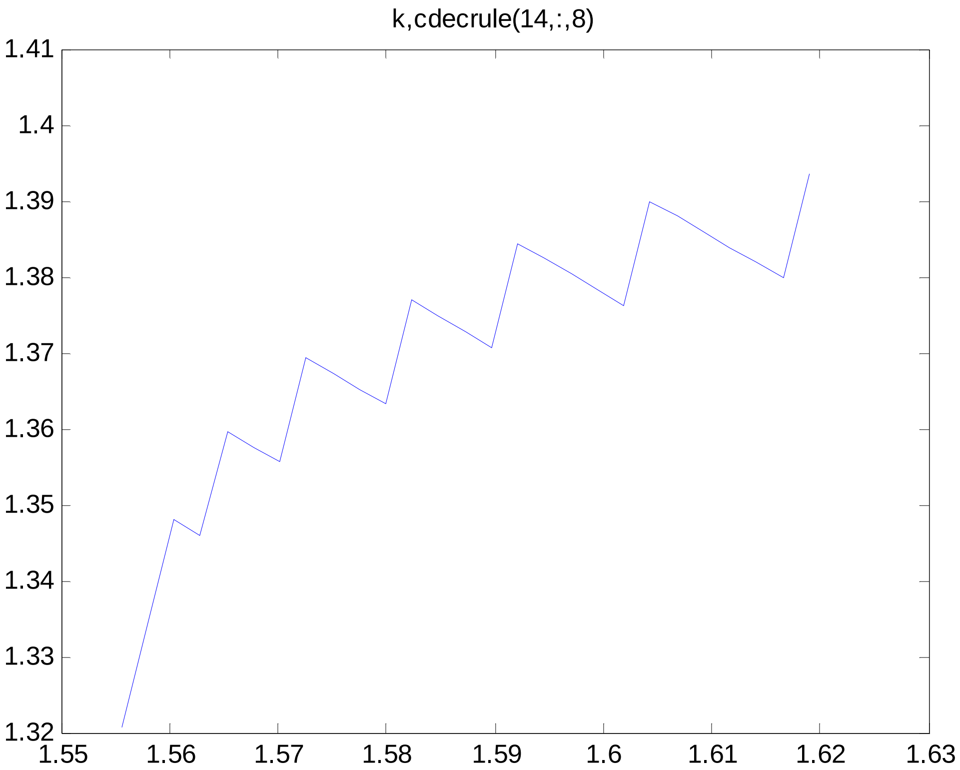

k,cdecrule(14,:,3)
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

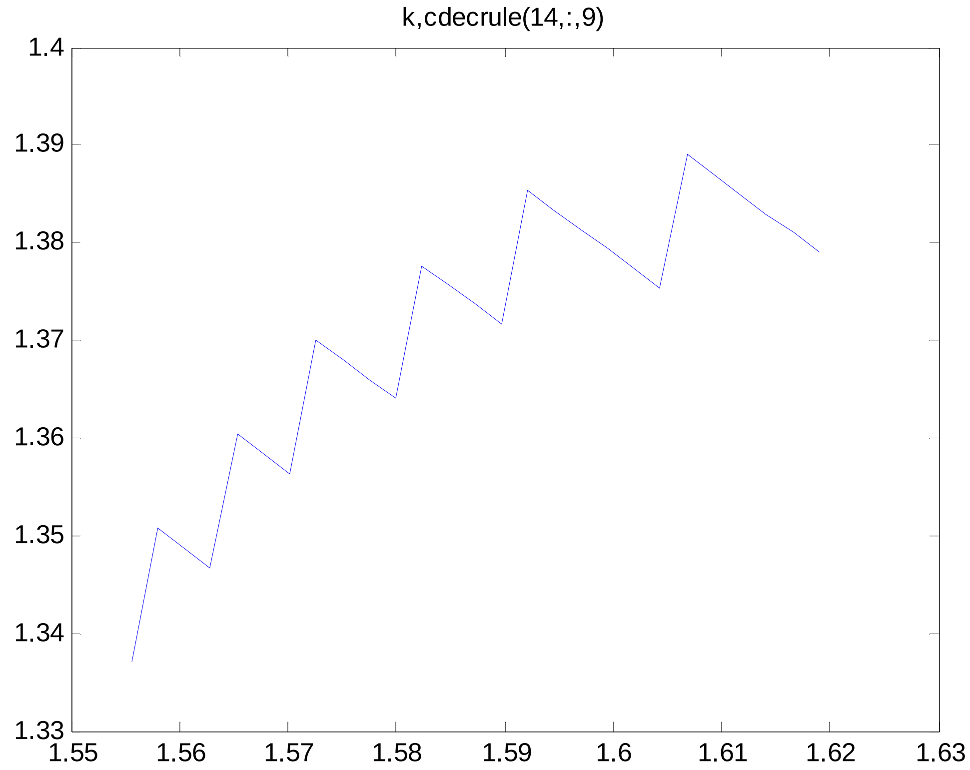

k,cdecrule(14,:,4)
1.4
1.35
1.3
1.25
1.2
1.15
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

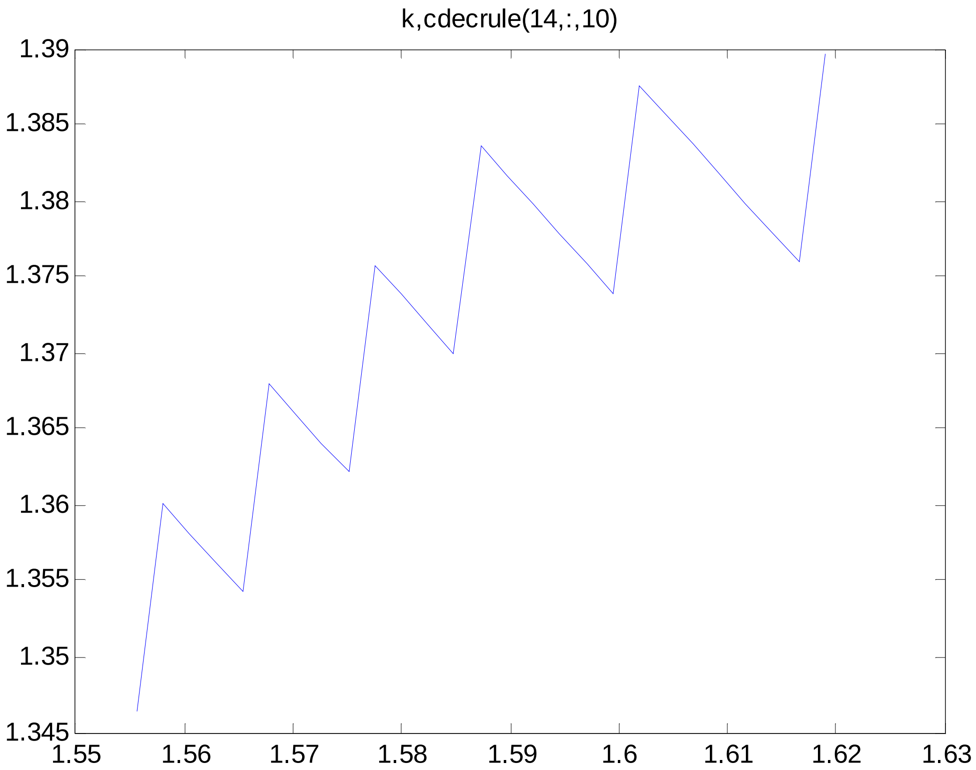

k,cdecrule(14,:,5)
1.4
1.35
1.3
1.25
1.2
1.15
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,6)
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

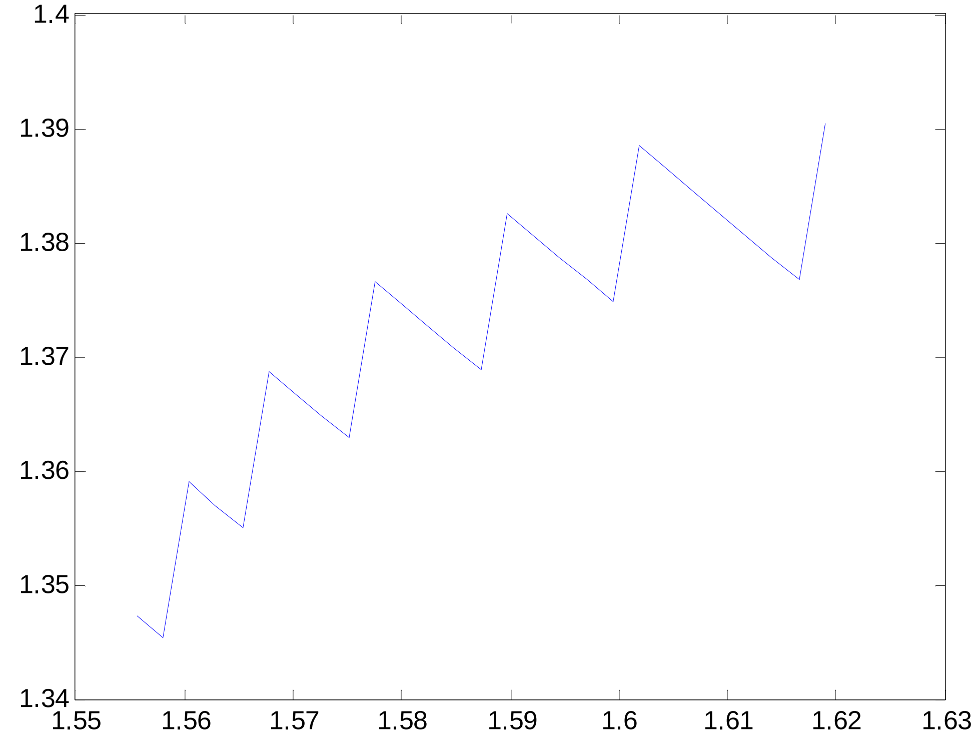

k,cdecrule(14,:,7)
1.4
1.35
1.3
1.25
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,8)
1.41
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.33
1.32
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

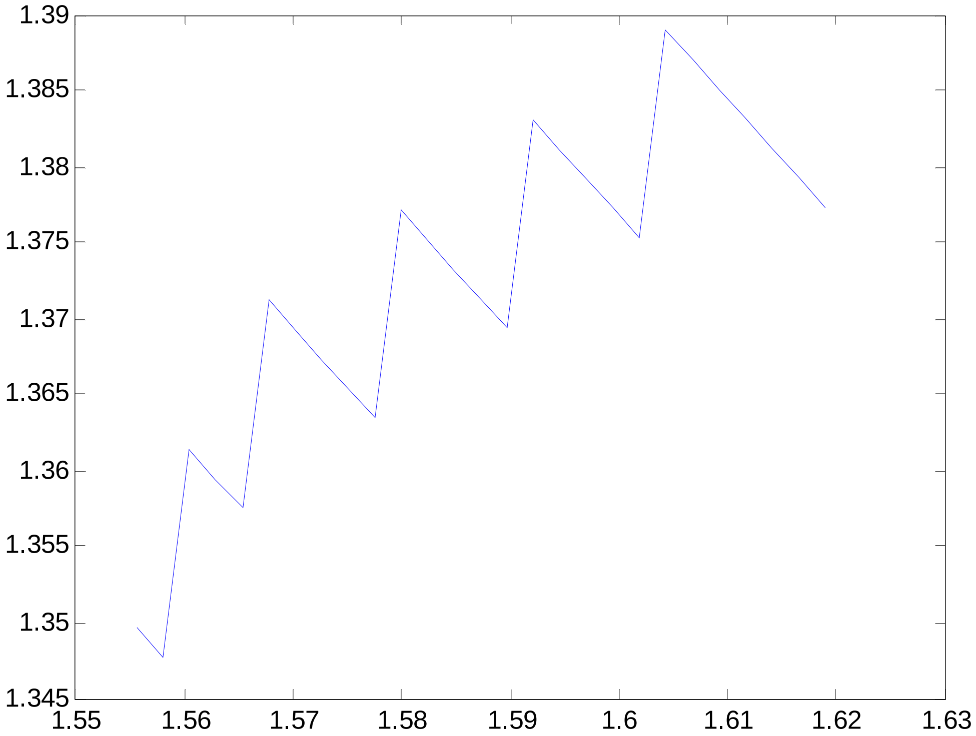

k,cdecrule(14,:,9)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.33
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

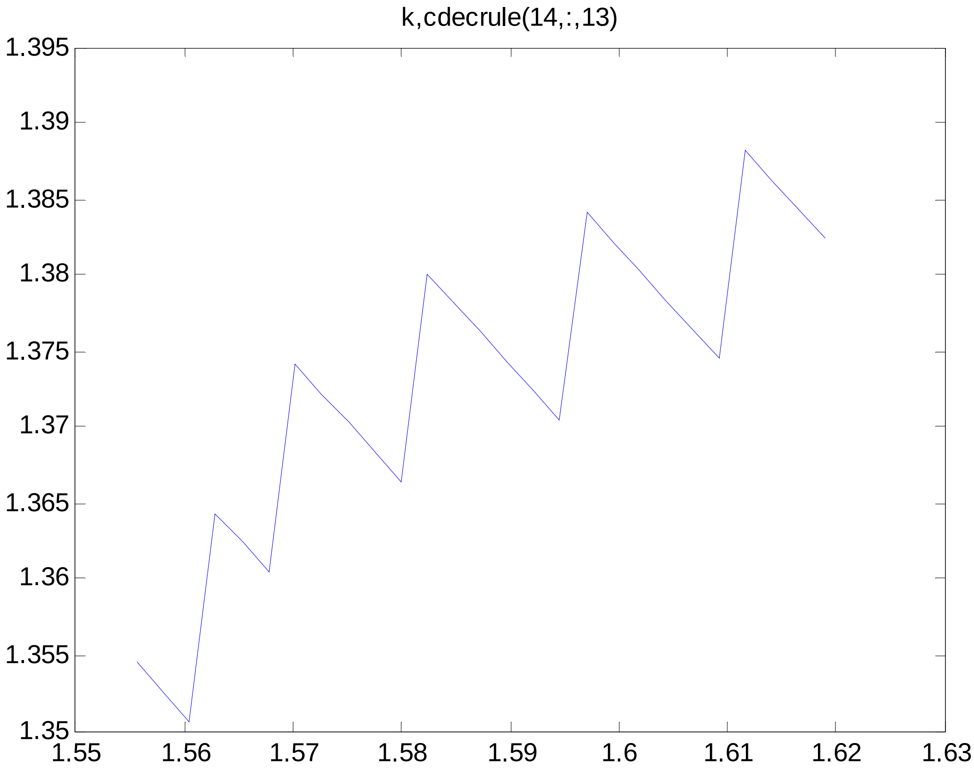

k,cdecrule(14,:,10)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

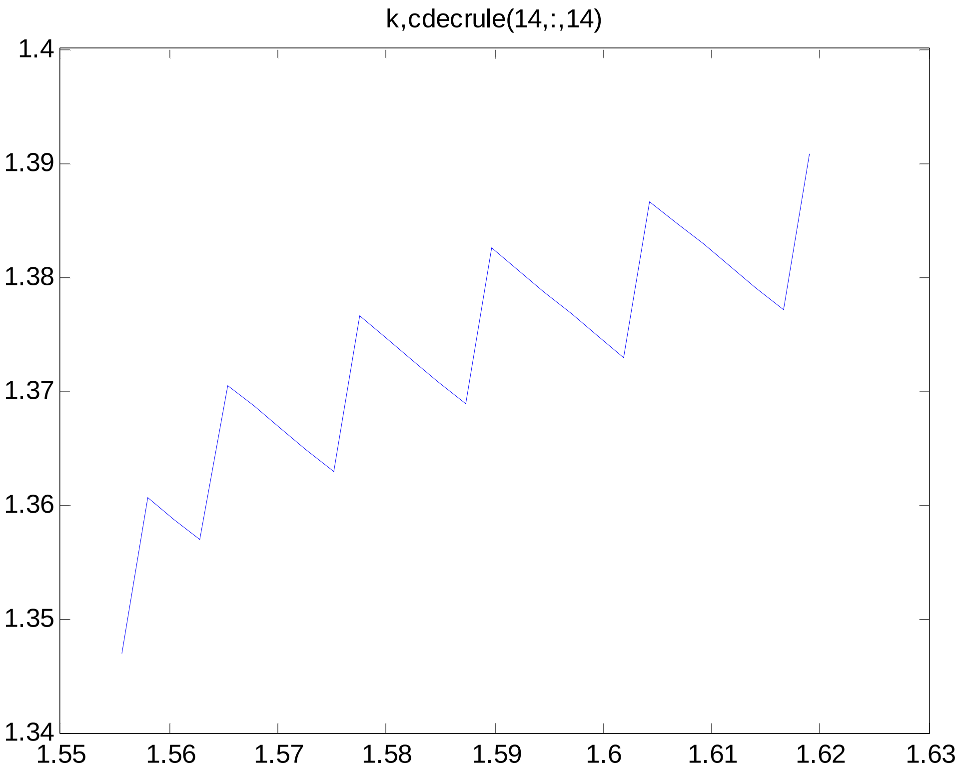
k,cdecrule(14,:,11)

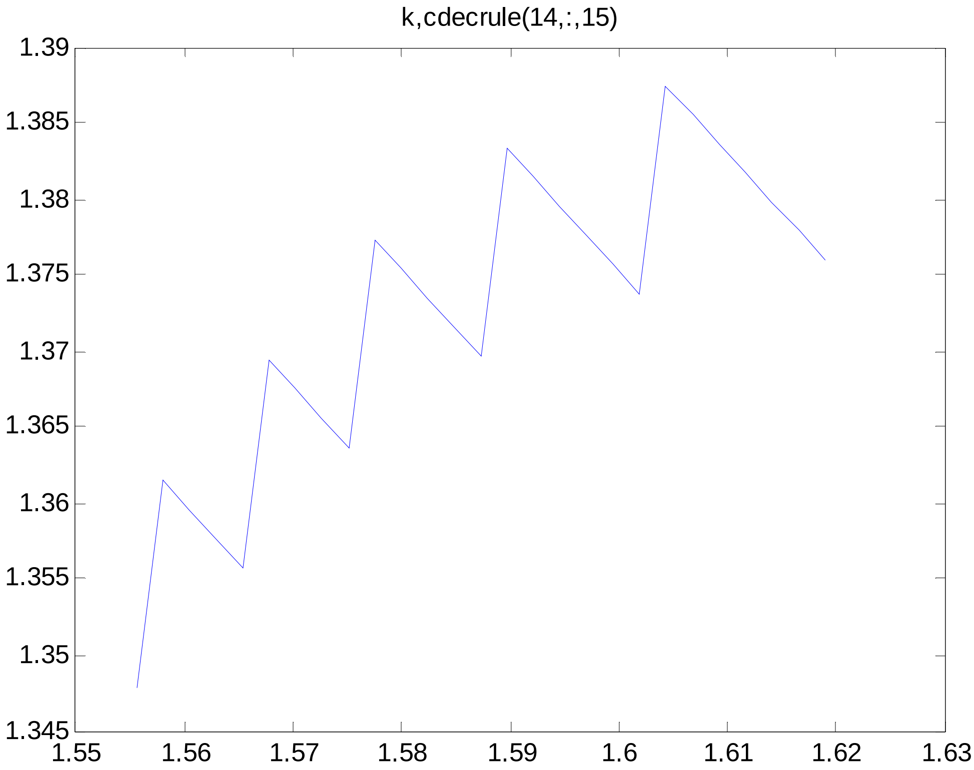


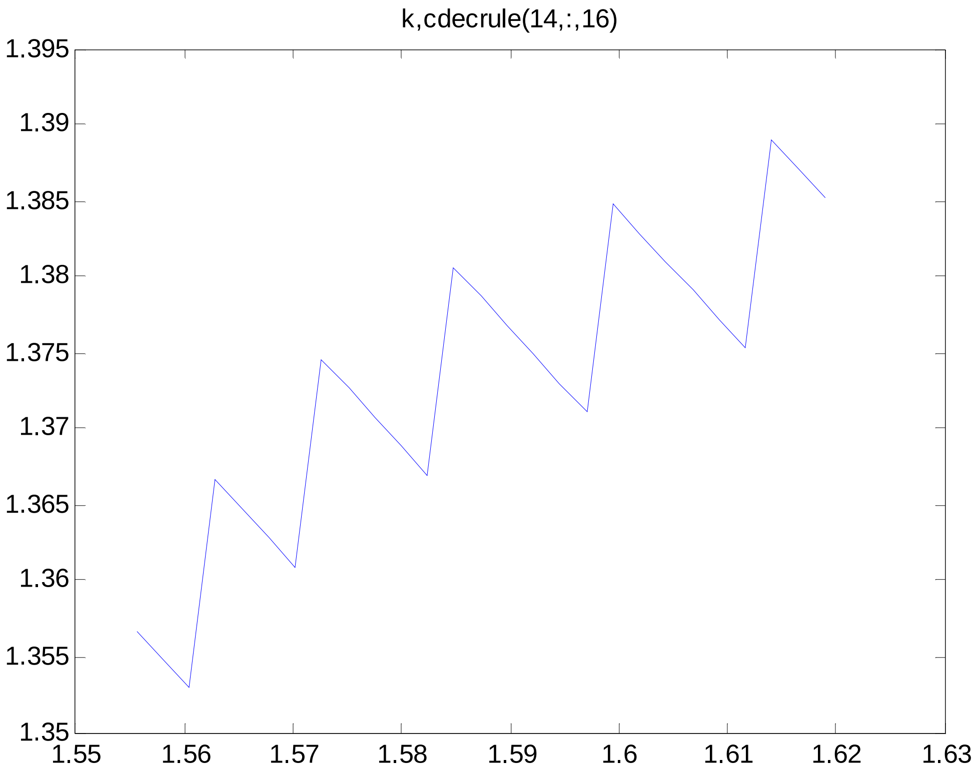
k,cdecrule(14,:,12)



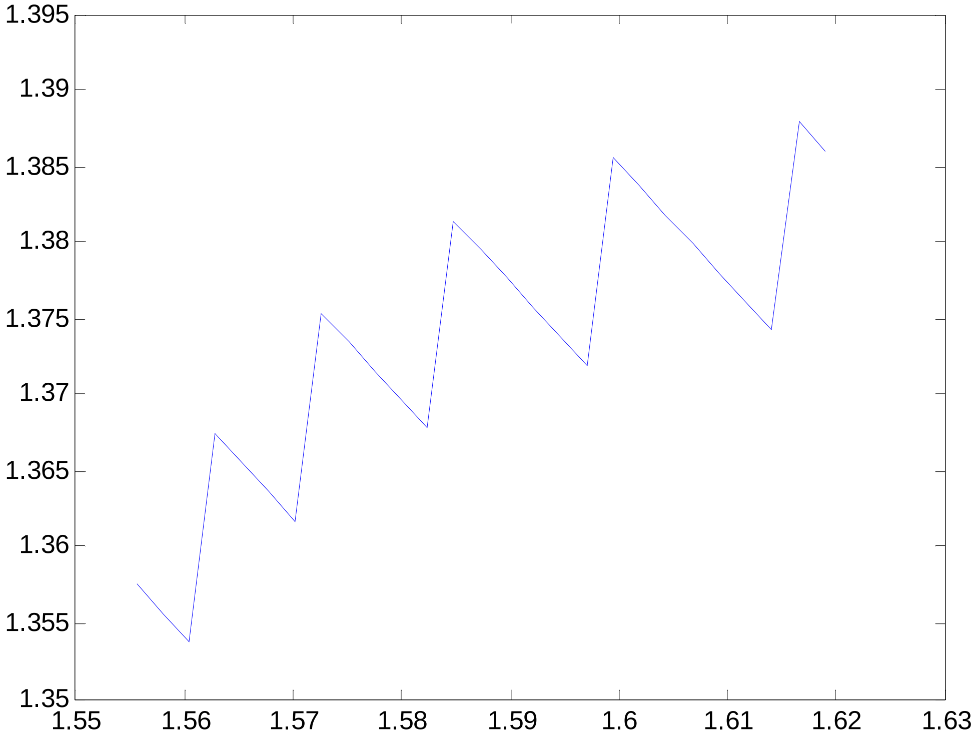

k,cdecrule(14,:,13)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

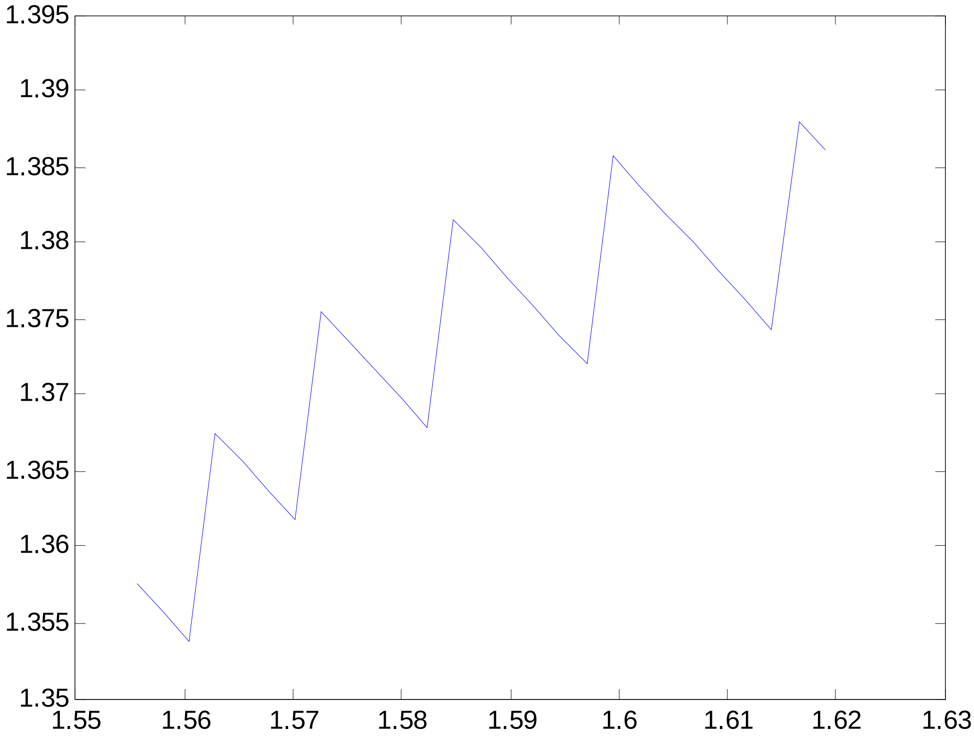

k,cdecrule(14,:,15)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

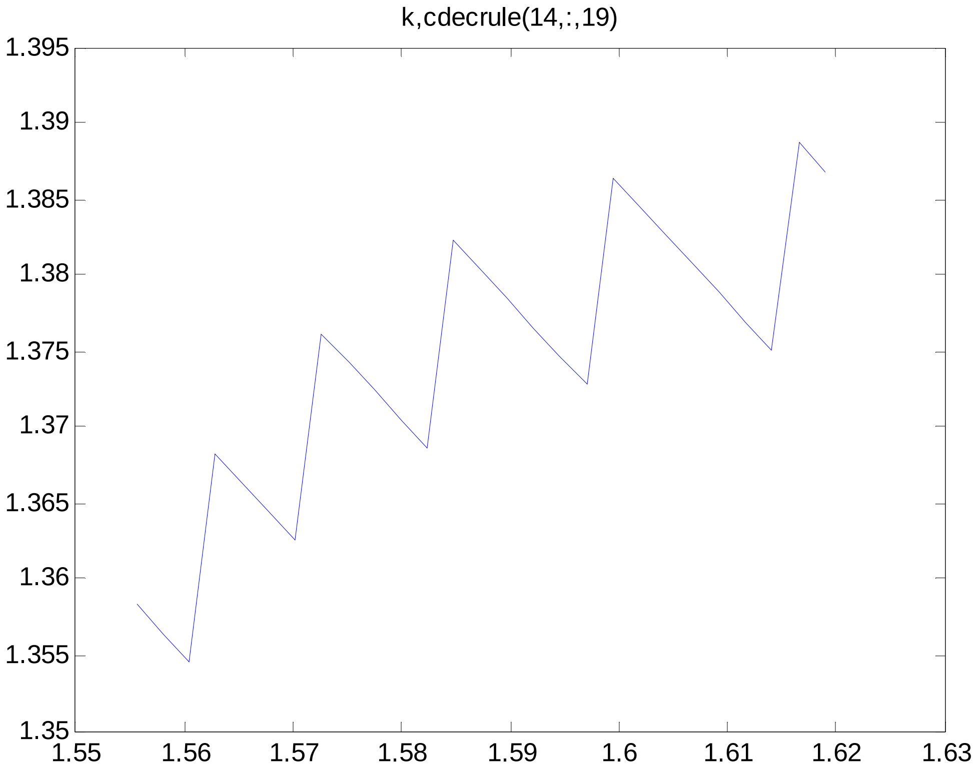

k,cdecrule(14,:,16)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

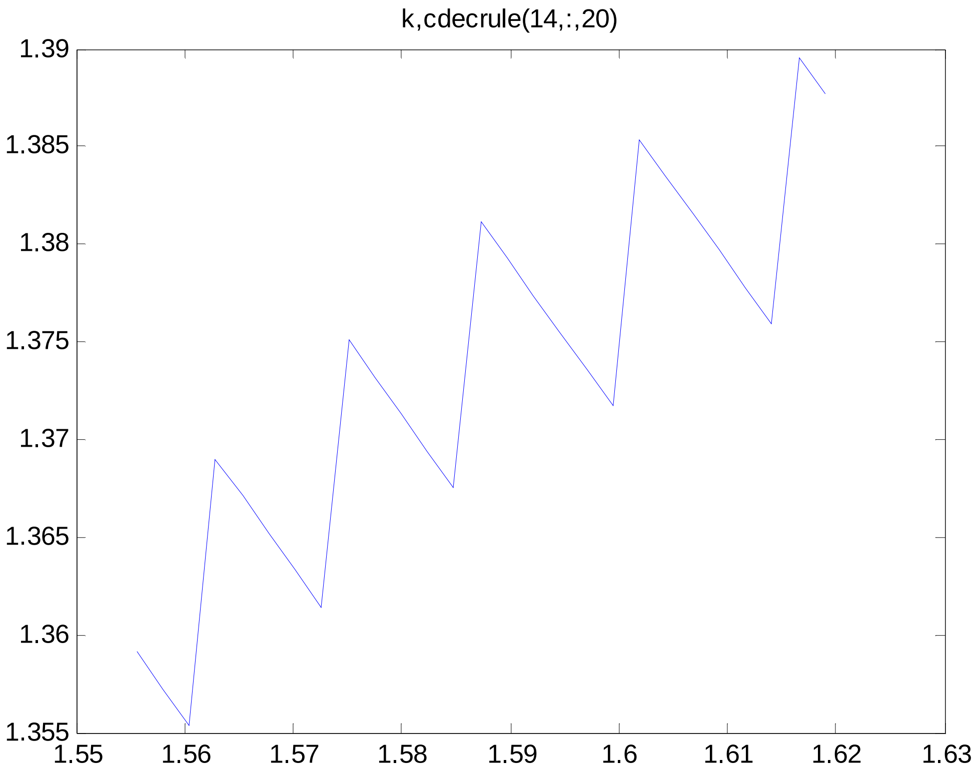
k,cdecrule(14,:,17)



k,cdecrule(14,:,18)




k,cdecrule(14,:,19)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,20)
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1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.55
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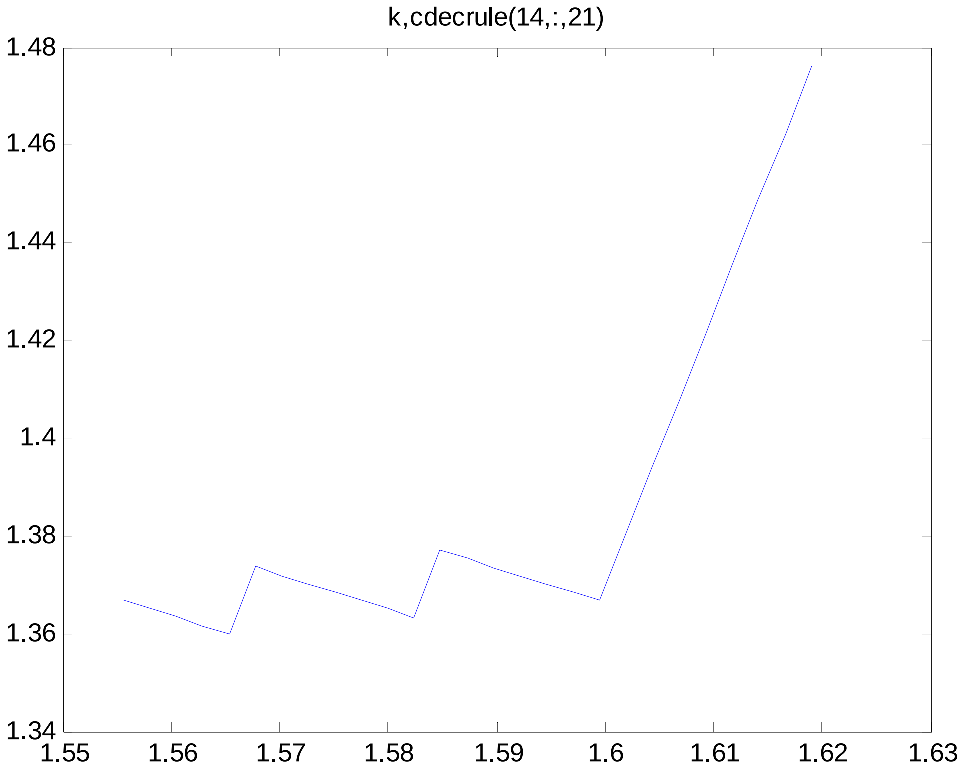
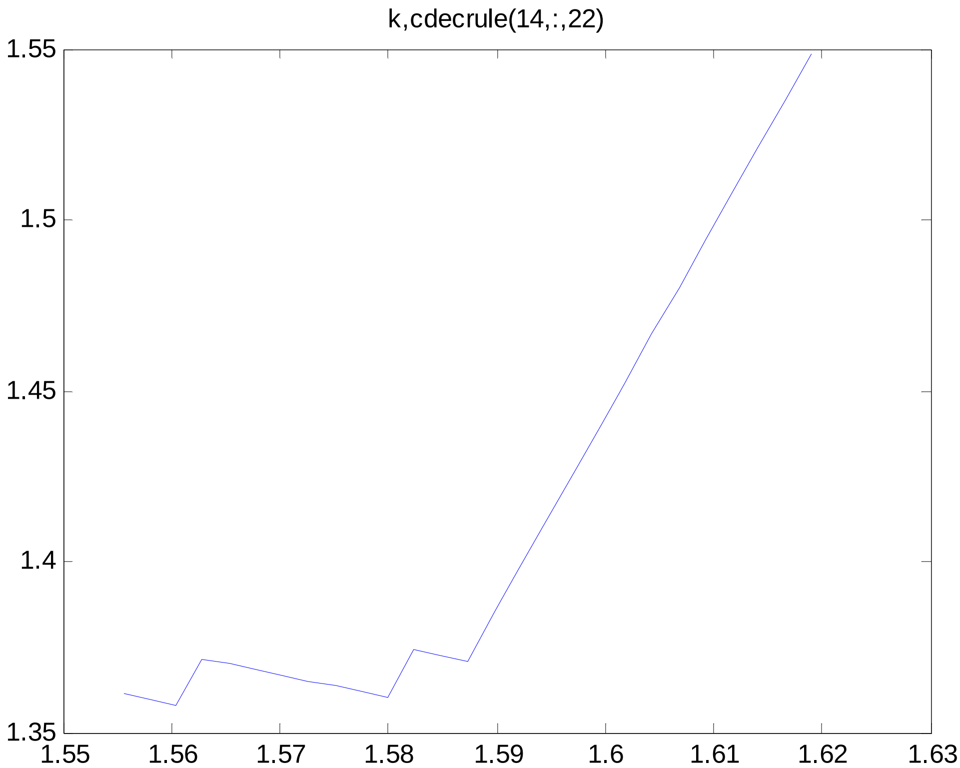
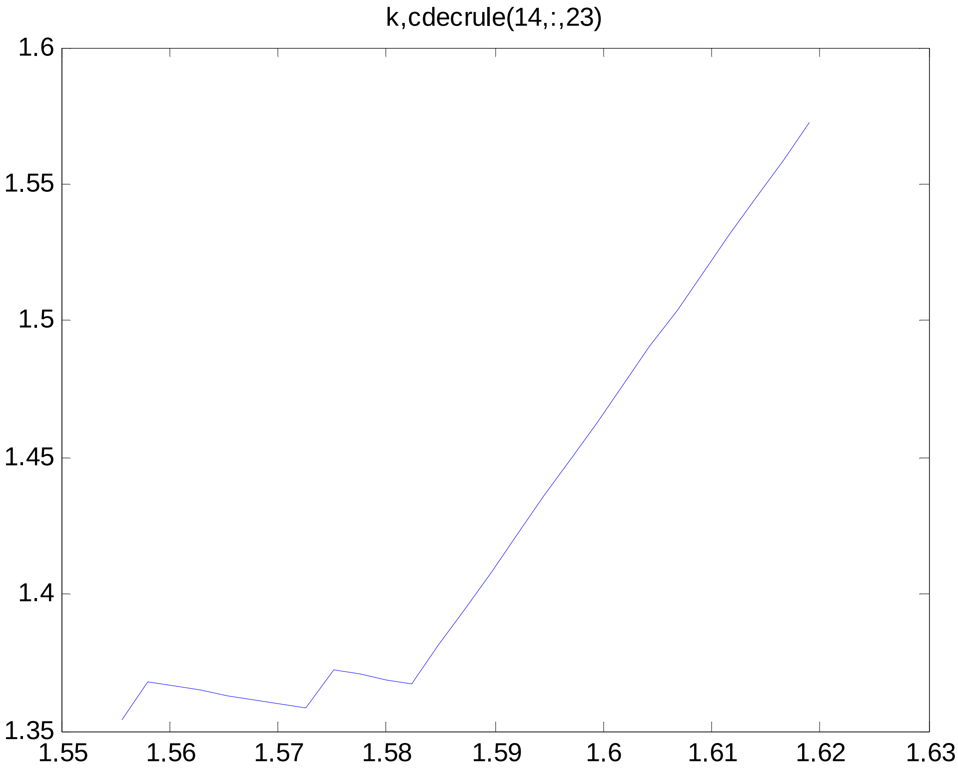
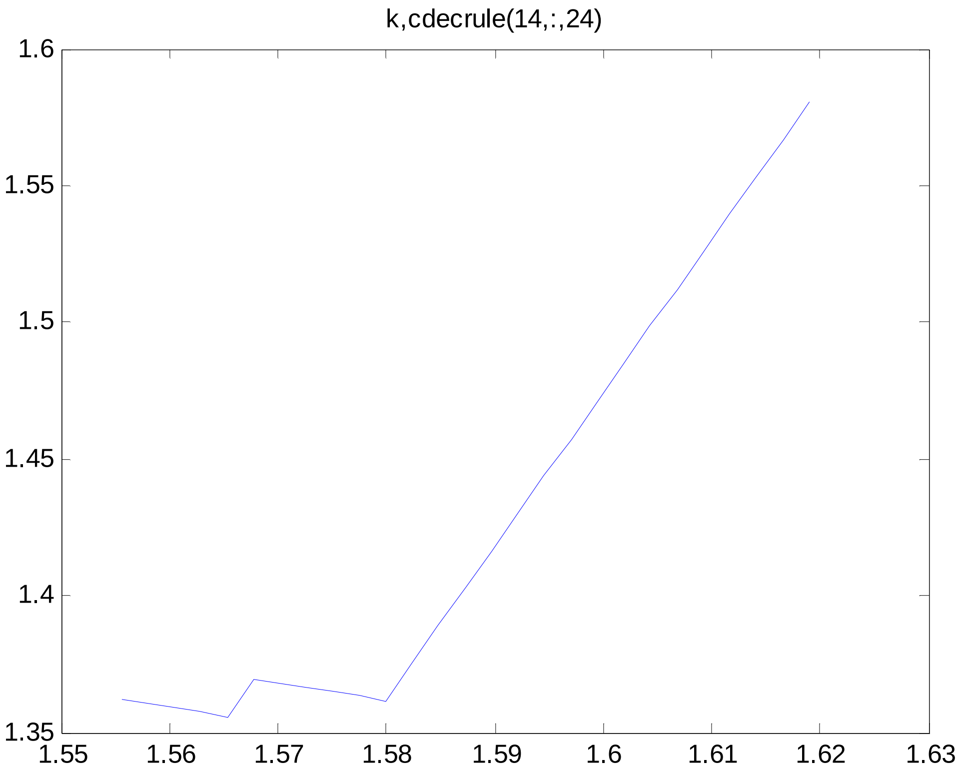
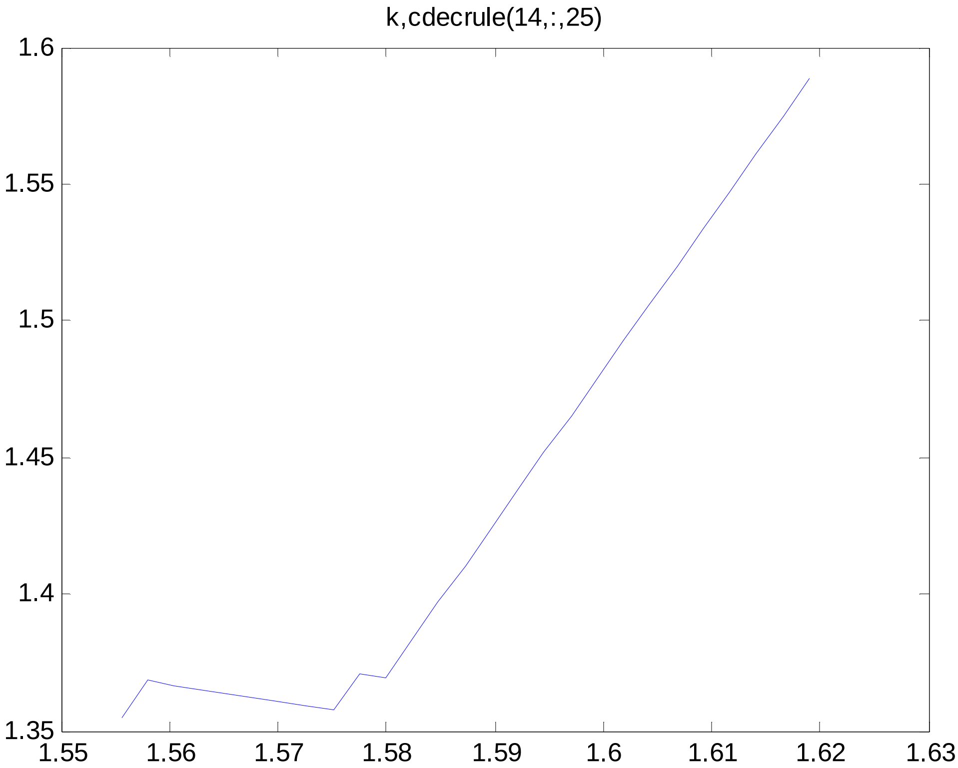
1.61
1.62
1.63


k,cdecrule(14,:,21)
1.48
1.46
1.44
1.42
1.4
1.38
1.36
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,22)
1.55
1.5
1.45
1.4
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,23)
1.6
1.55
1.5
1.45
1.4
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,24)
1.6
1.55
1.5
1.45
1.4
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(14,:,25)
1.6
1.55
1.5
1.45
1.4
1.35
1.55
1.56
1.57
1.58
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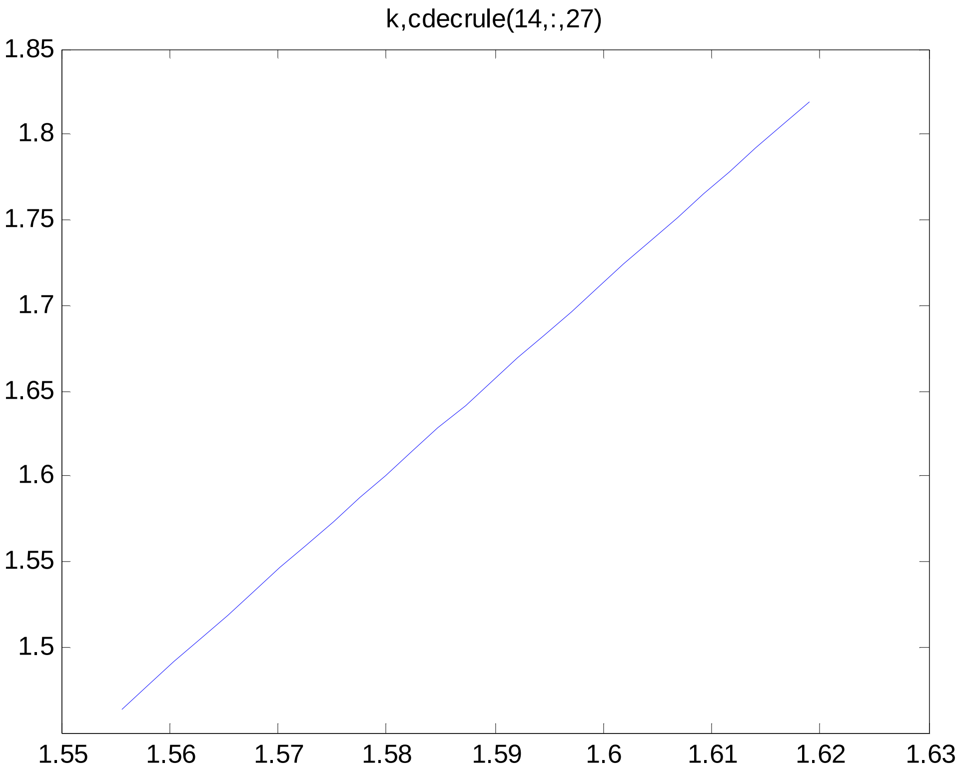
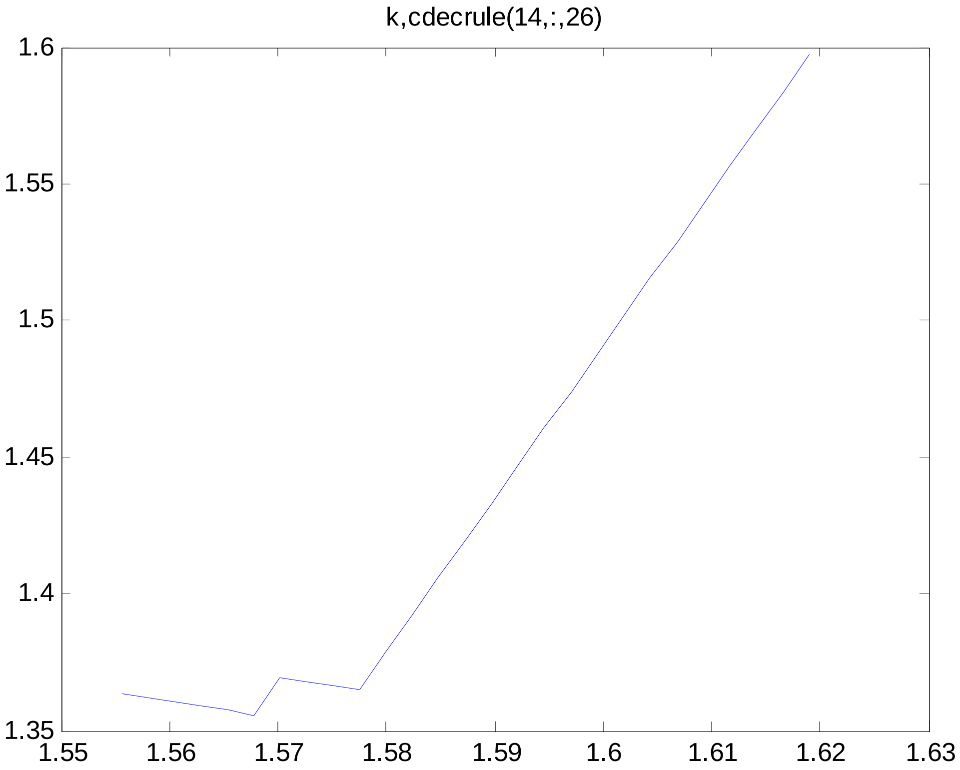
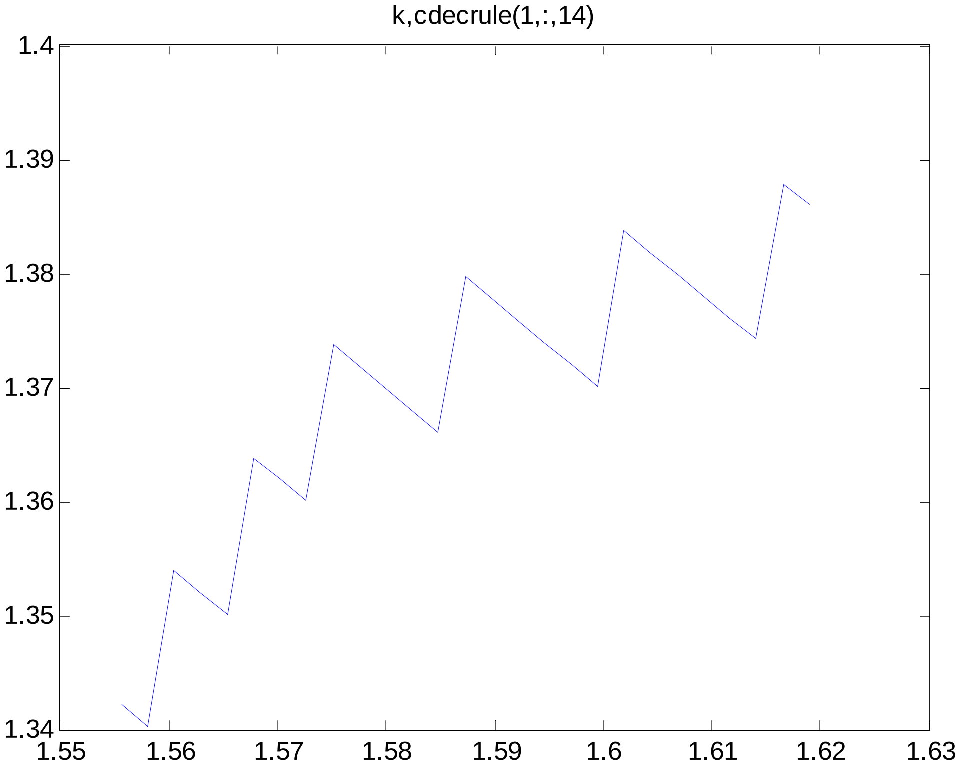
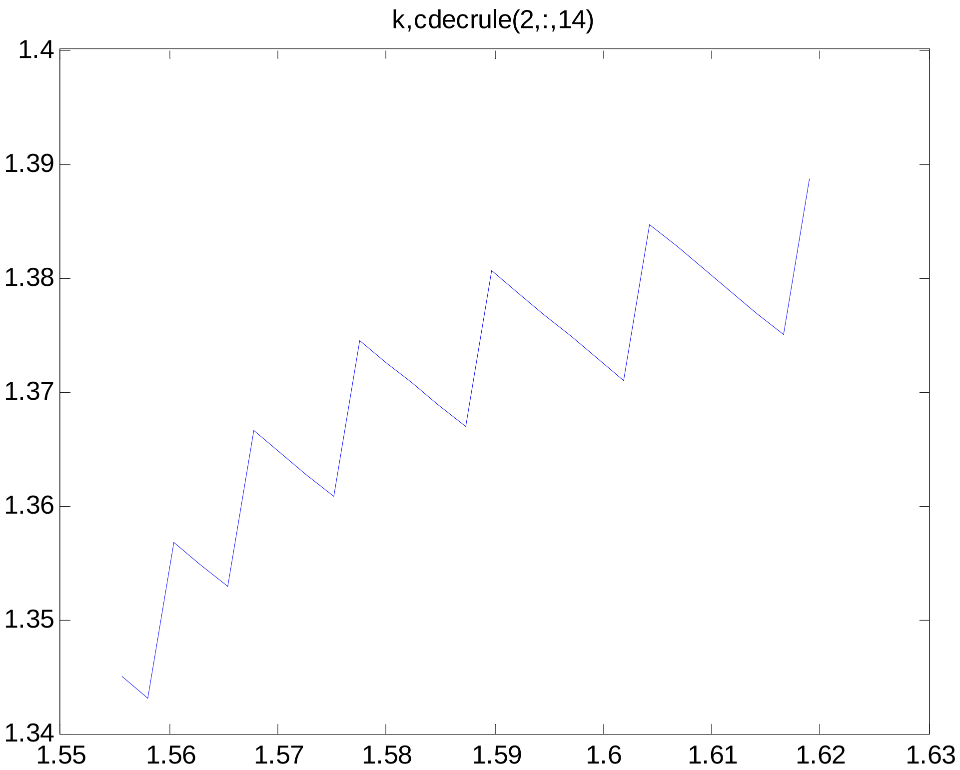
1.6
1.61
1.62
1.63

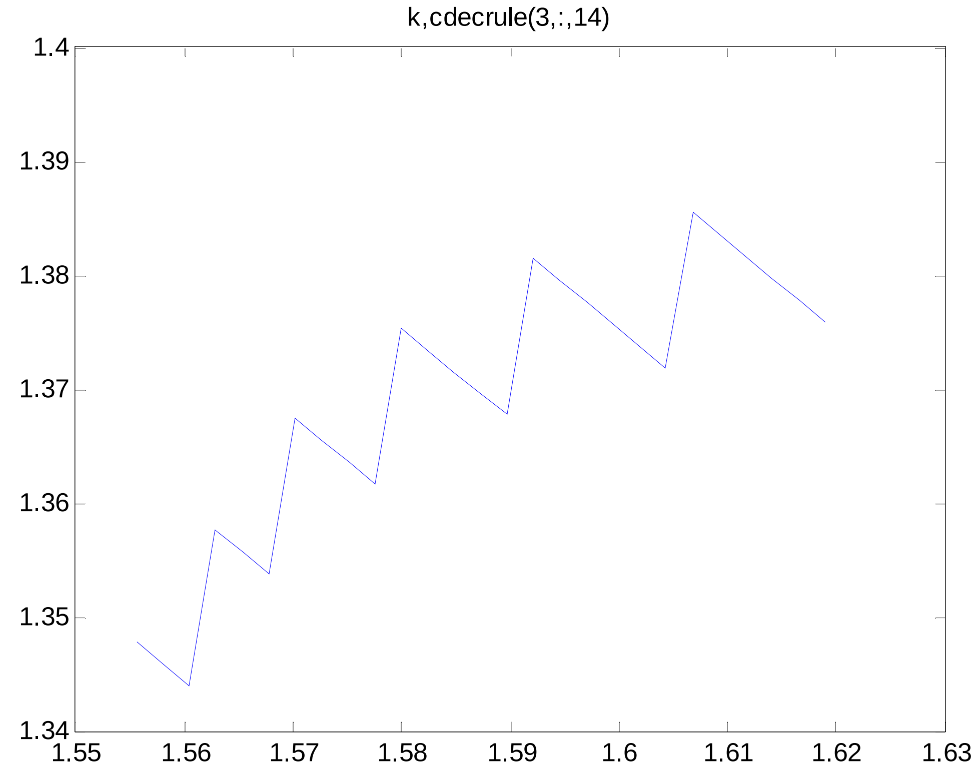

k,cdecrule(14,:,27)
1.85
1.8
1.75
1.7
1.65
1.6
1.55
1.5
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

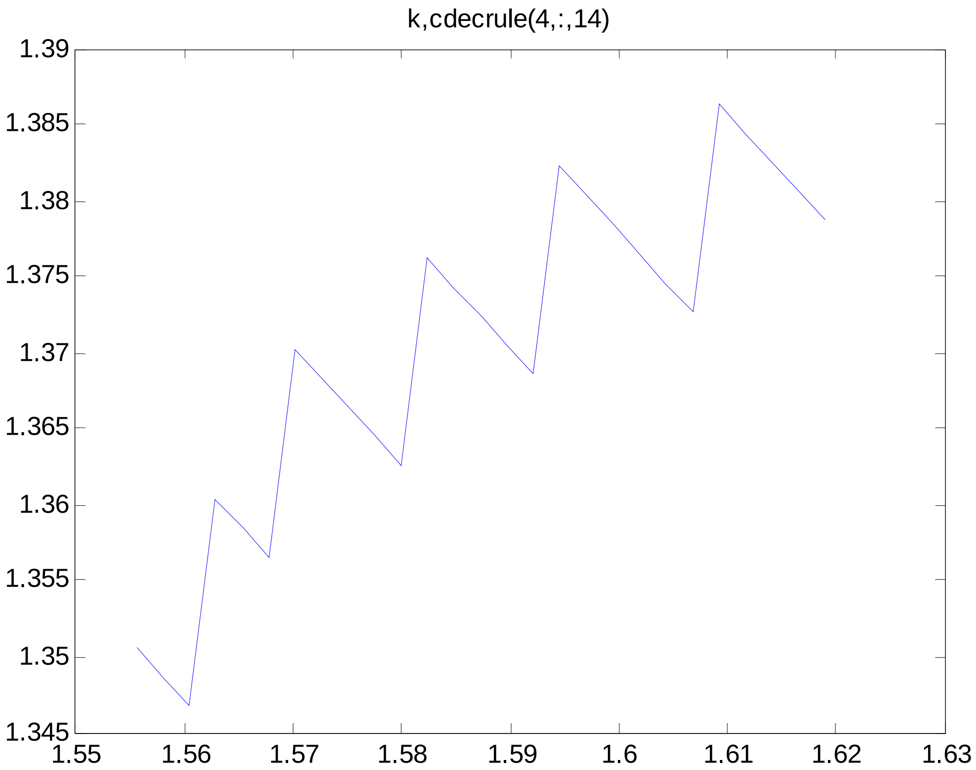

k,cdecrule(14,:,26)
1.6
1.55
1.5
1.45
1.4
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

Case_6


k,cdecrule(1,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(2,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(3,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(4,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
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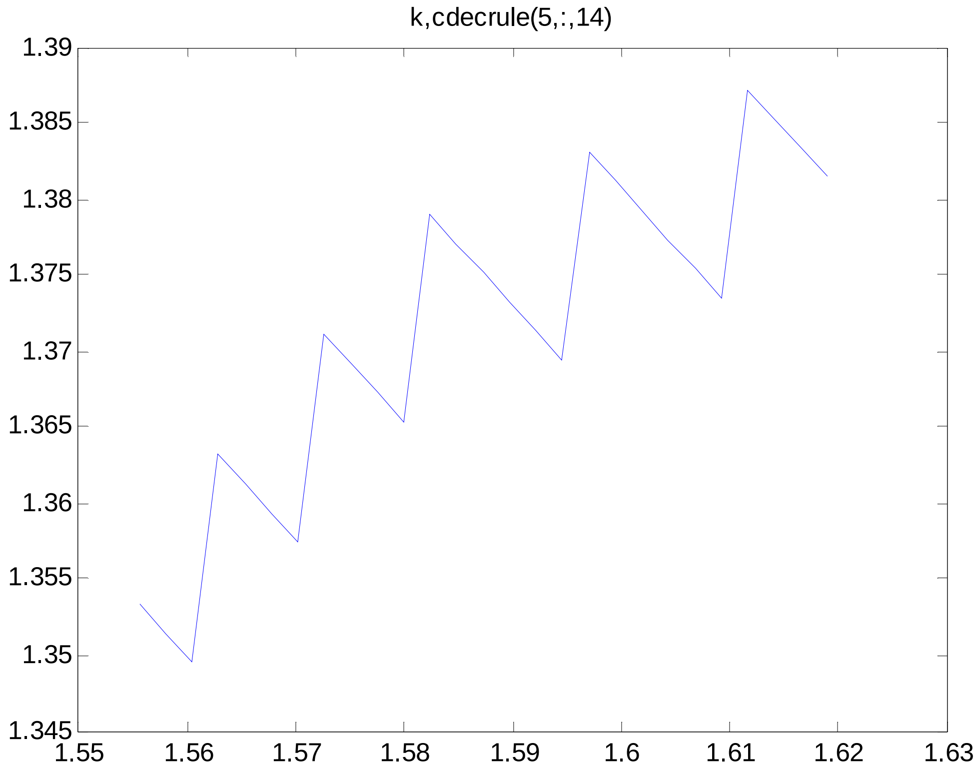
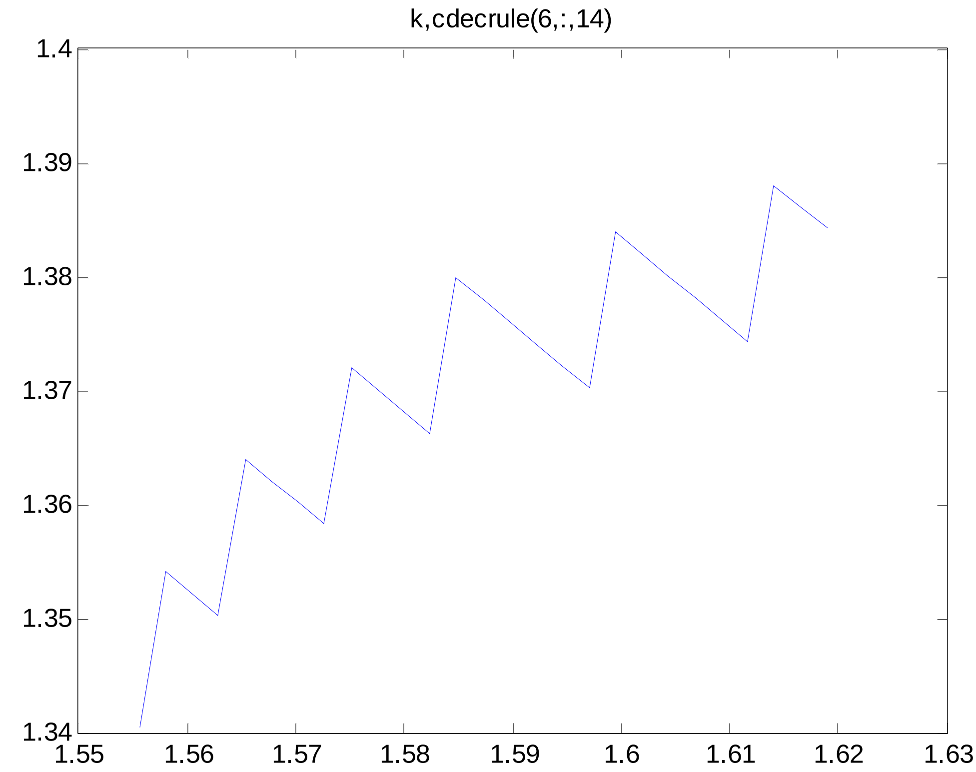
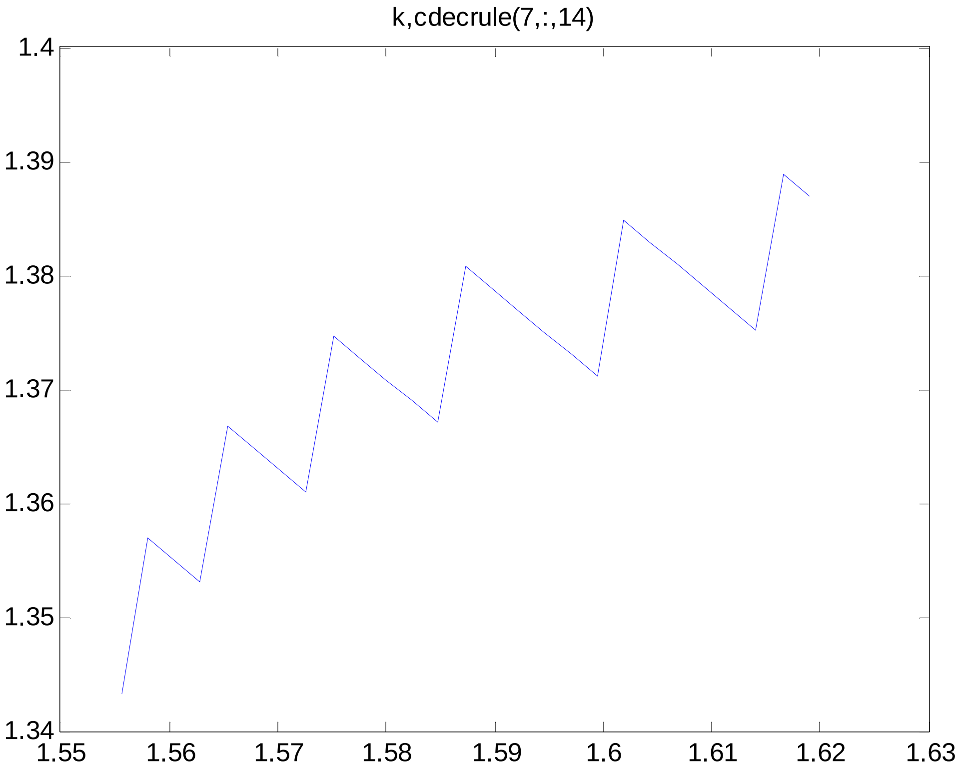
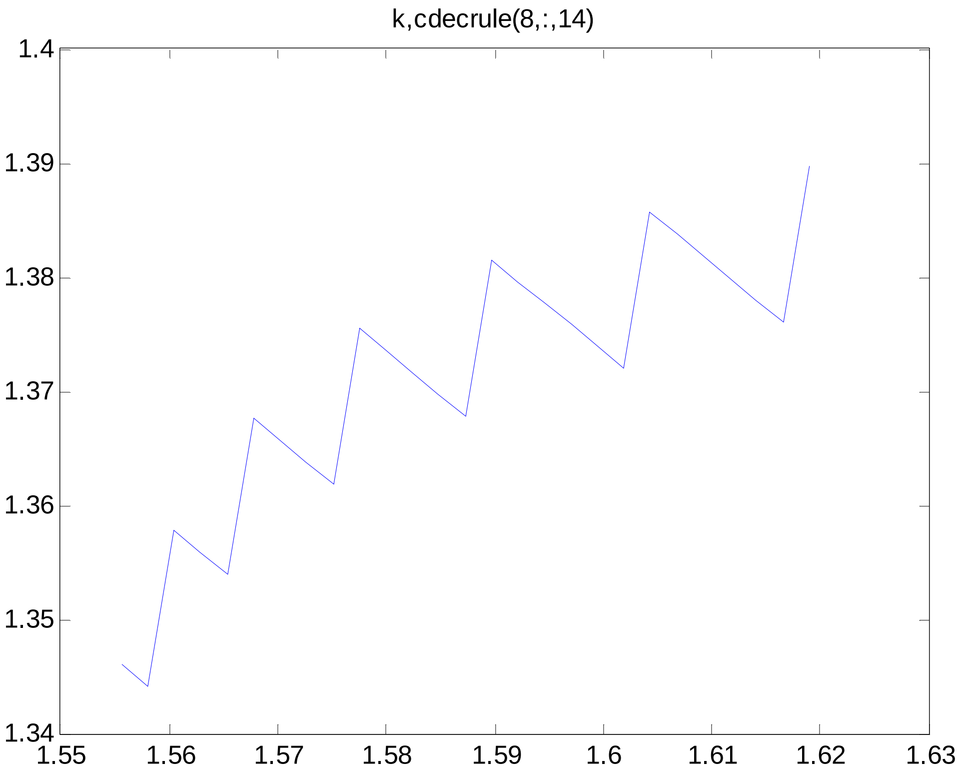
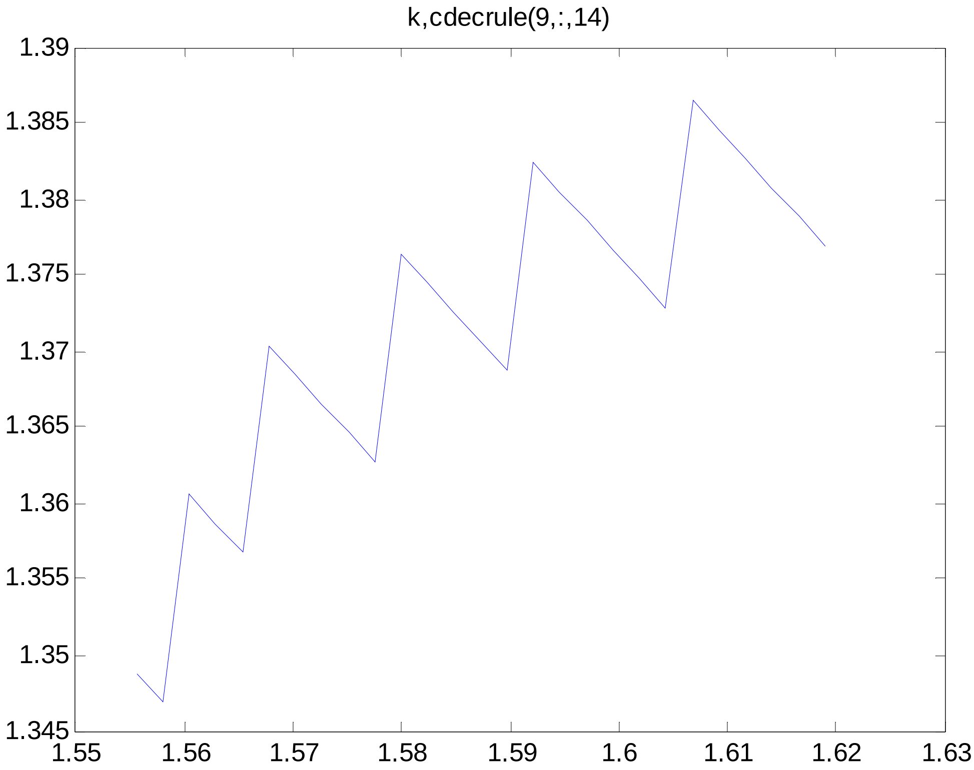
1.59
1.6
1.61
1.62
1.63

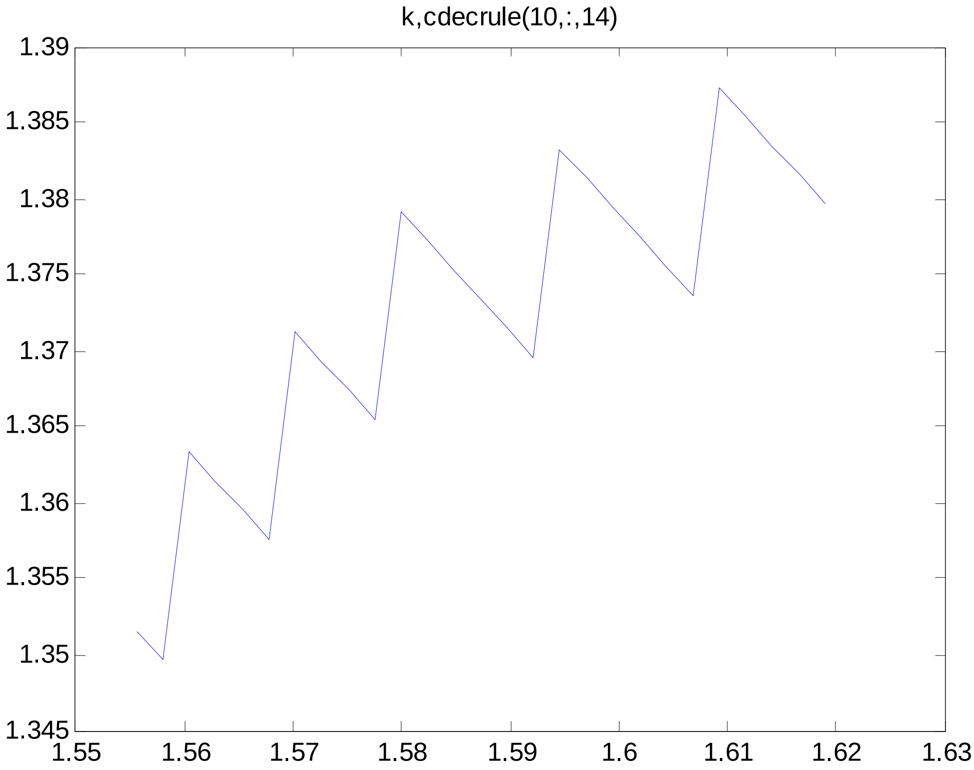

k,cdecrule(5,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(6,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(7,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(8,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(9,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(10,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
1.55
1.56
1.57
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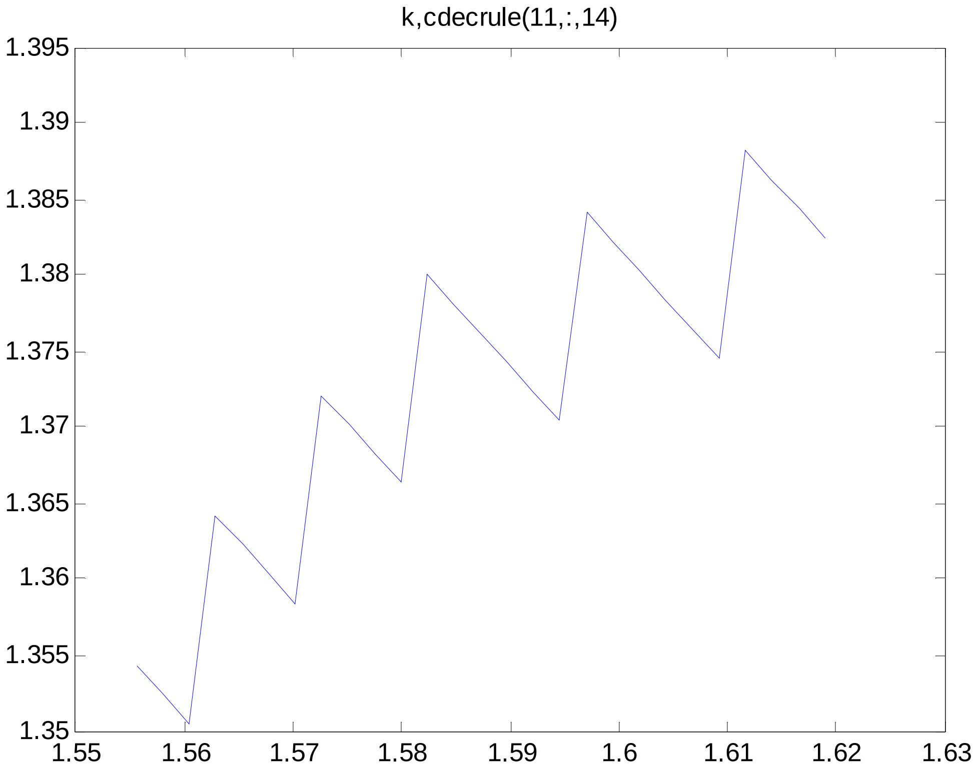
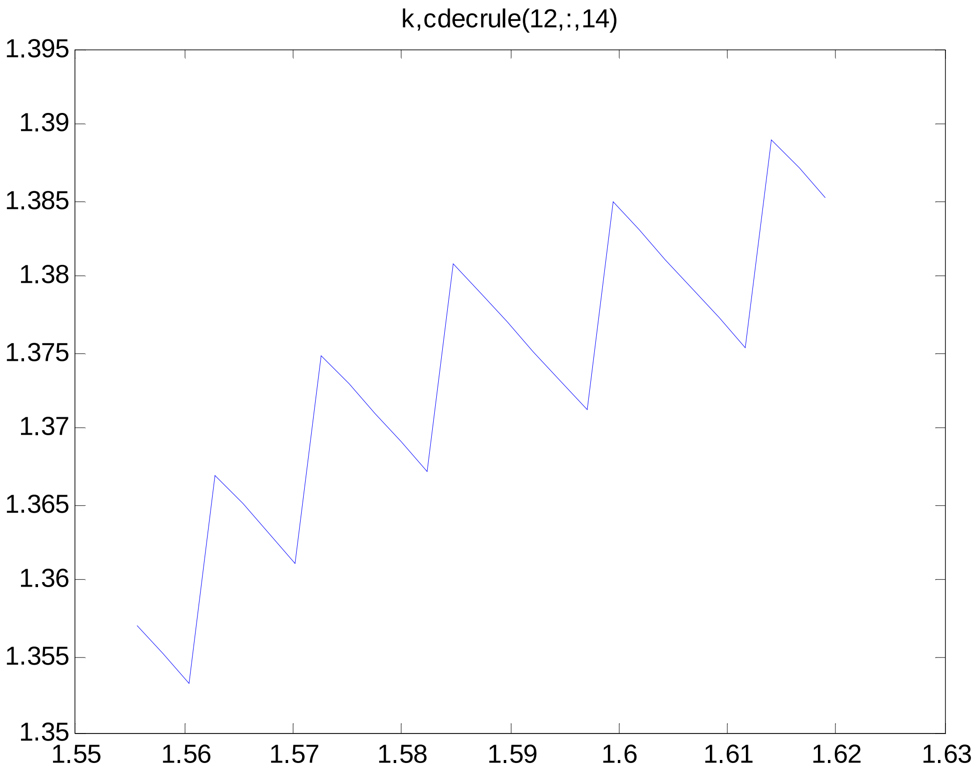
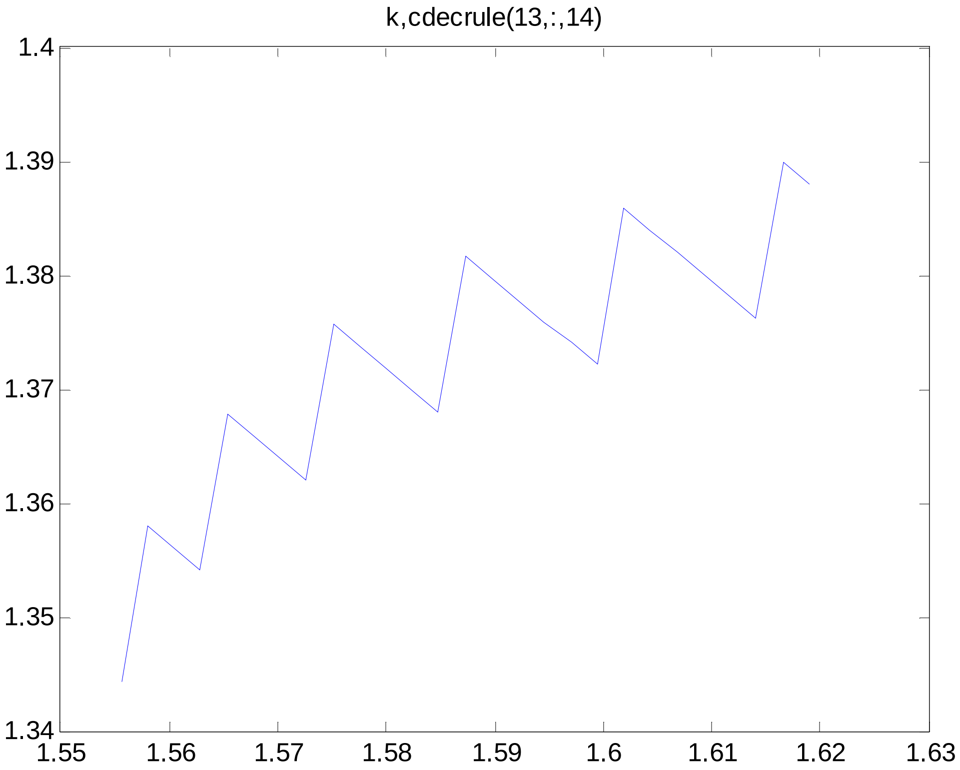
1.61
1.62
1.63


k,cdecrule(11,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(12,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(13,:,14)
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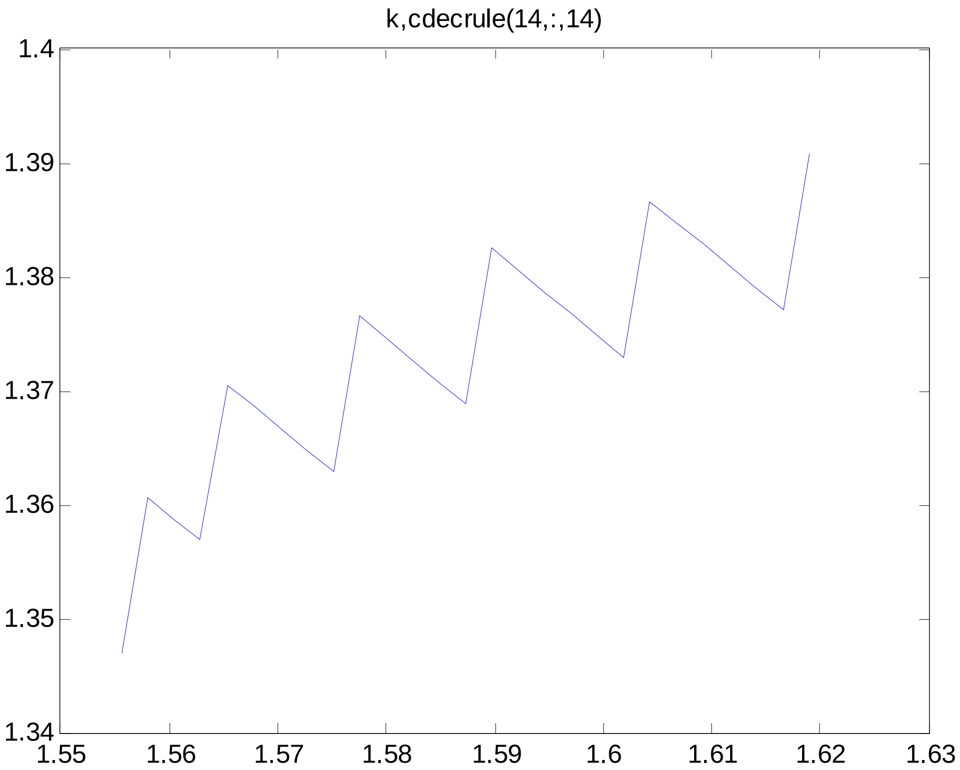
1.62
1.63


k,cdecrule(14,:,14)
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1.58
1.59
1.6
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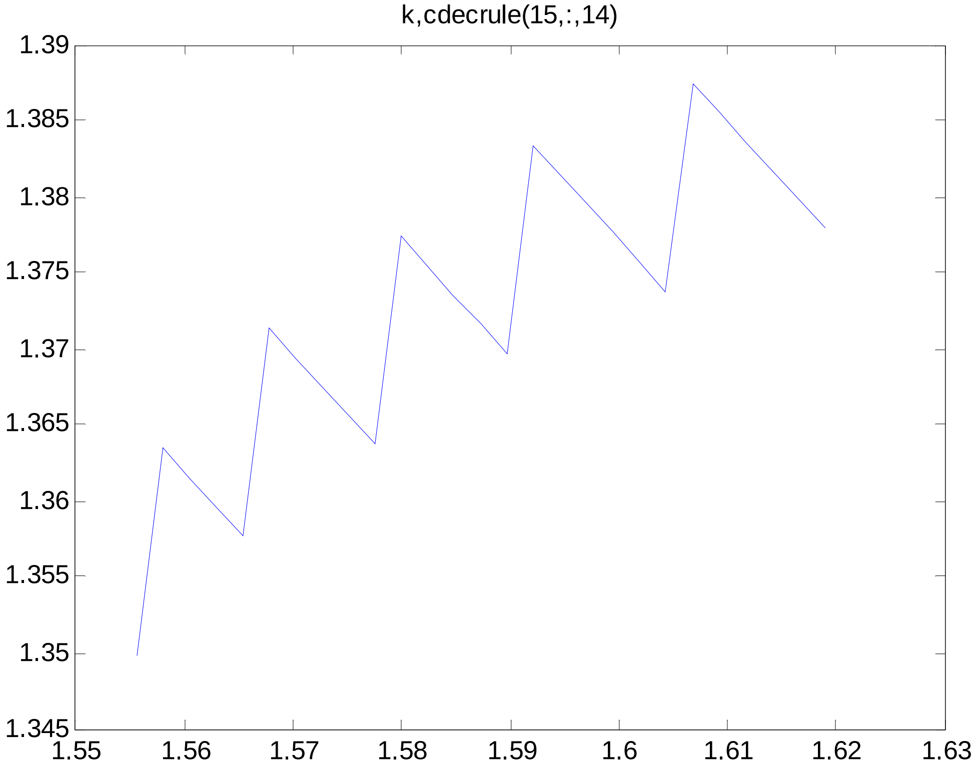
1.62
1.63


k,cdecrule(15,:,14)
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1.37
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1.36
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1.55
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1.57
1.58
1.59
1.6
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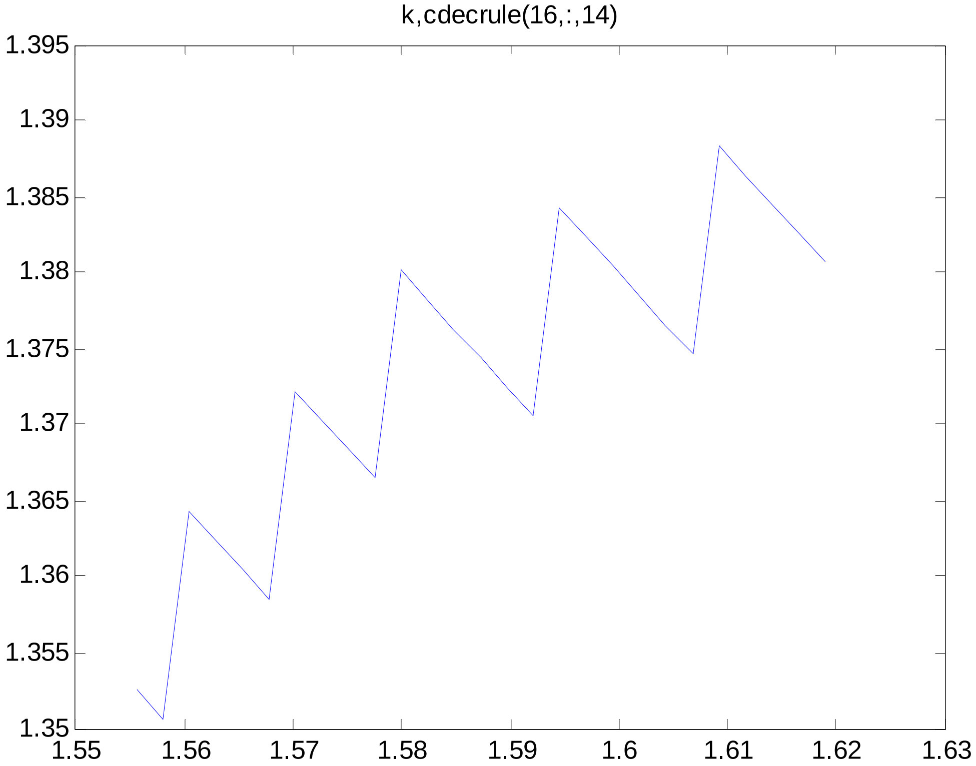
1.62
1.63


k,cdecrule(16,:,14)
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1.38
1.375
1.37
1.365
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1.35
1.55
1.56
1.57
1.58
1.59
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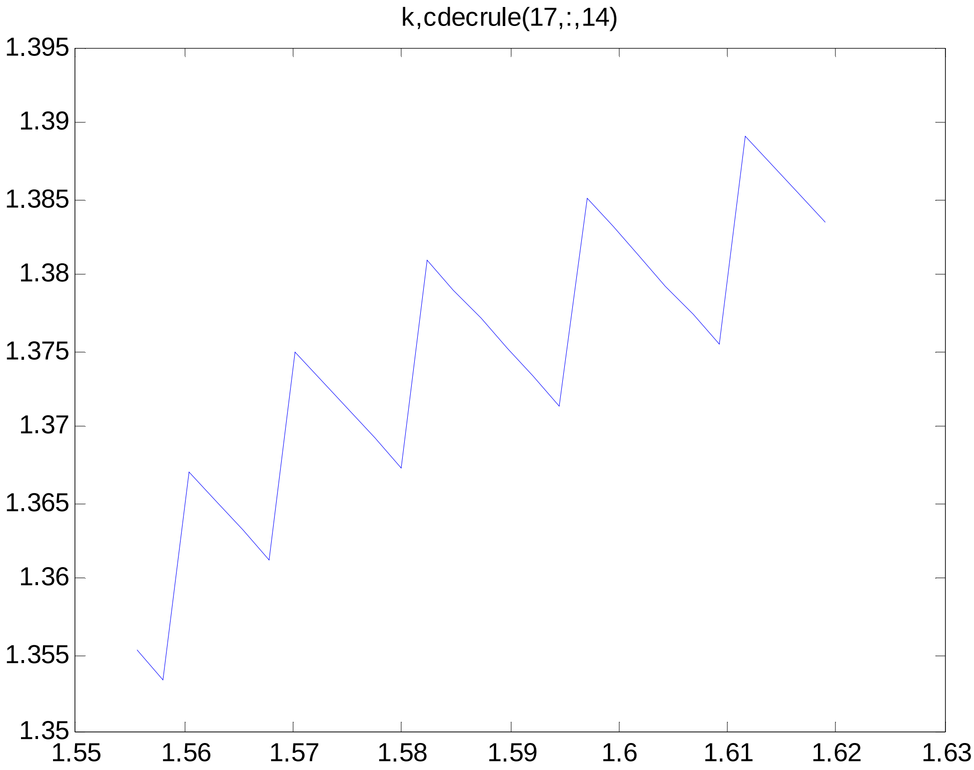
1.62
1.63


k,cdecrule(17,:,14)
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1.38
1.375
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1.35
1.55
1.56
1.57
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1.59
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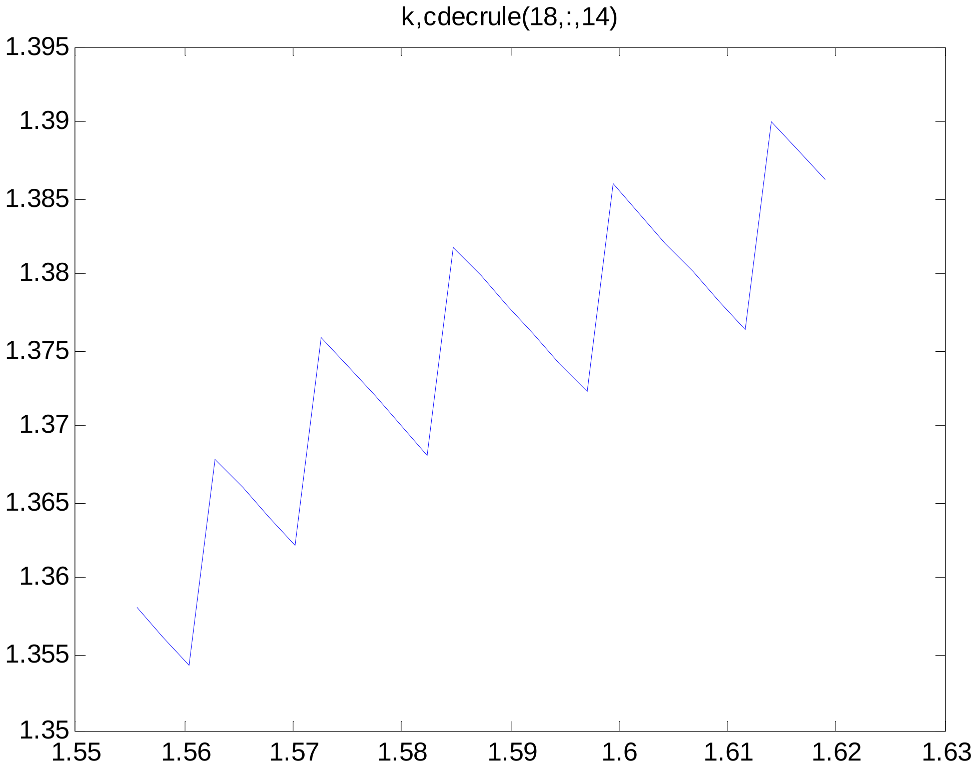
1.62
1.63


k,cdecrule(18,:,14)
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1.365
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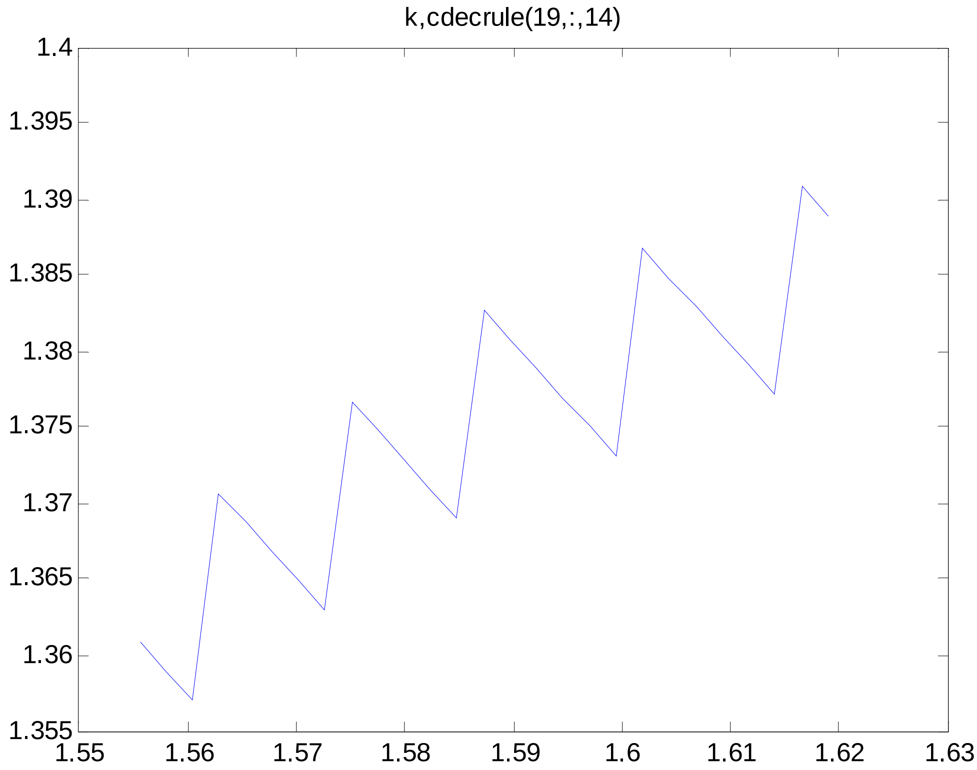
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63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1.38
1.375
1.37
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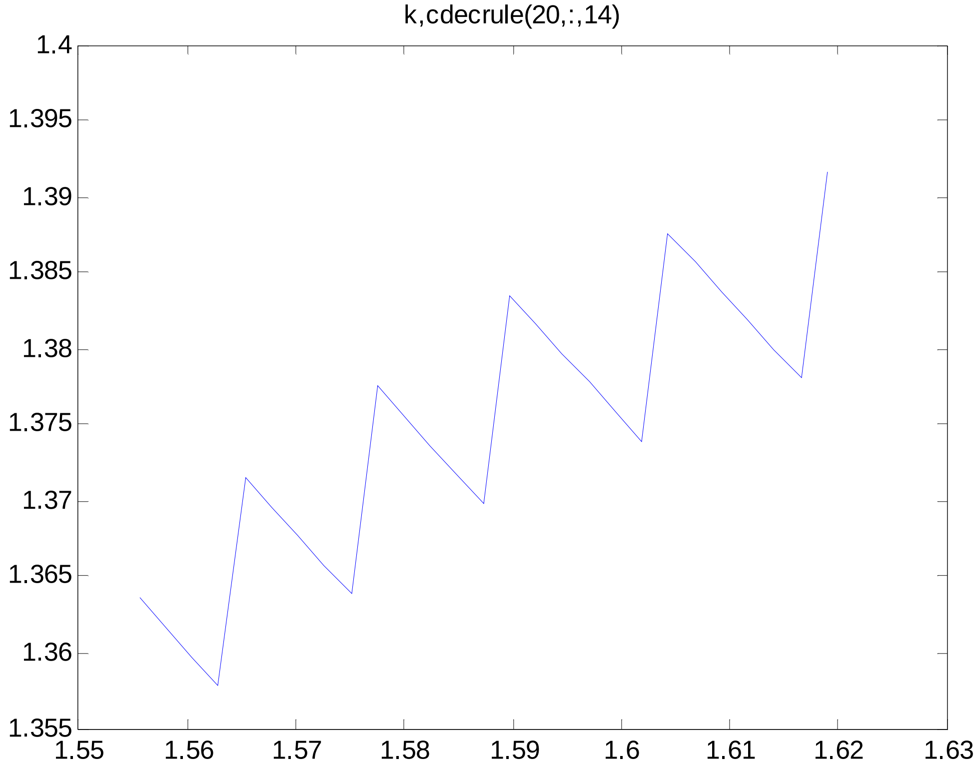
1.36
1.355
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(20,:,14)
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1.39
1.385
1.38
1.375
1.37
1.365
1.36
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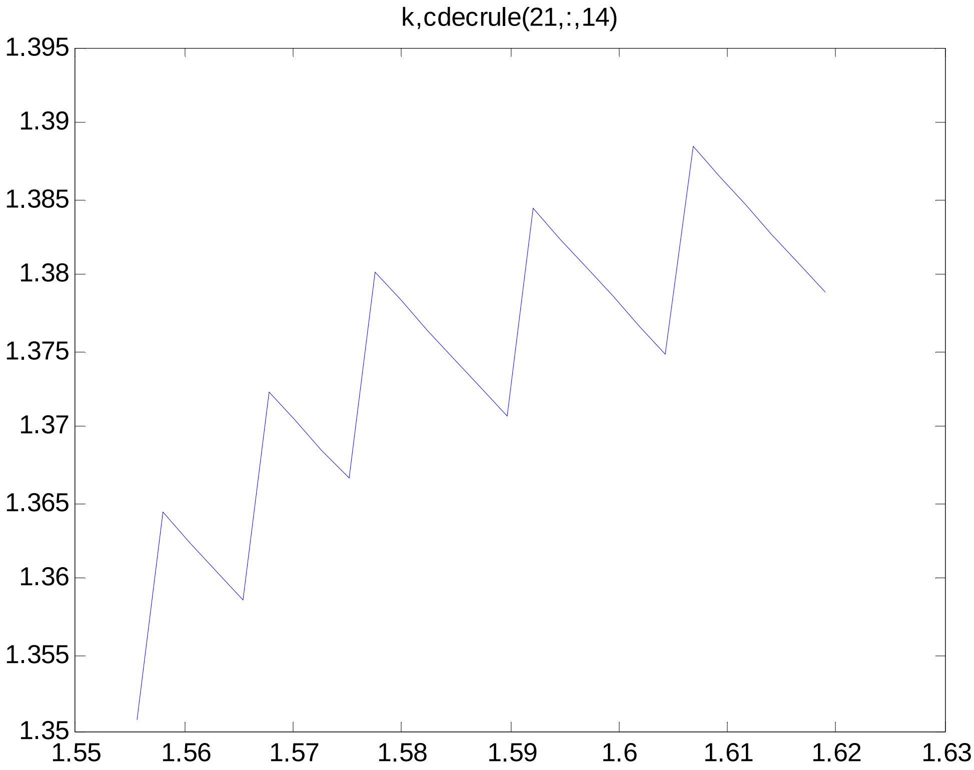
1.61
1.62
1.63


k,cdecrule(21,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
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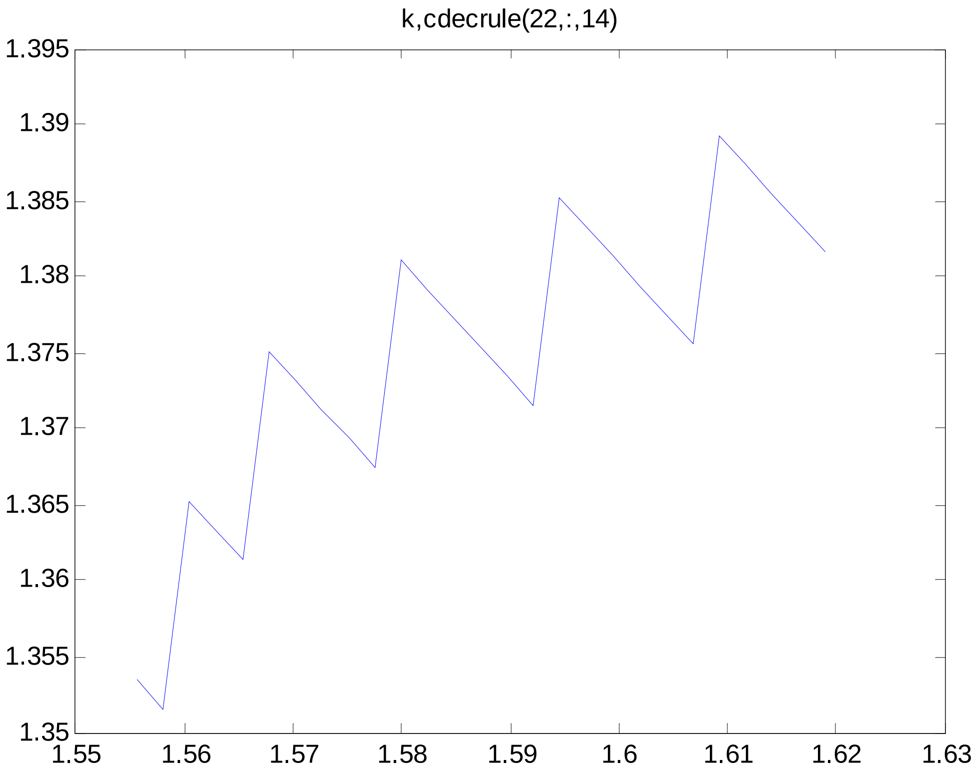
1.61
1.62
1.63


k,cdecrule(22,:,14)
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1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
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1.55
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1.57
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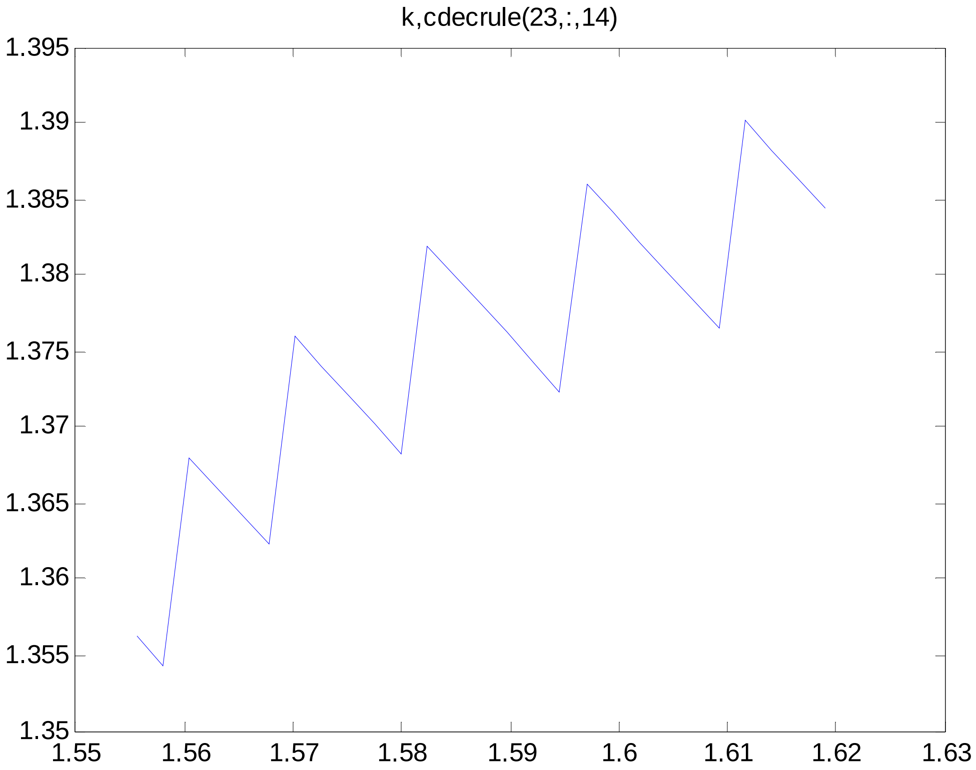
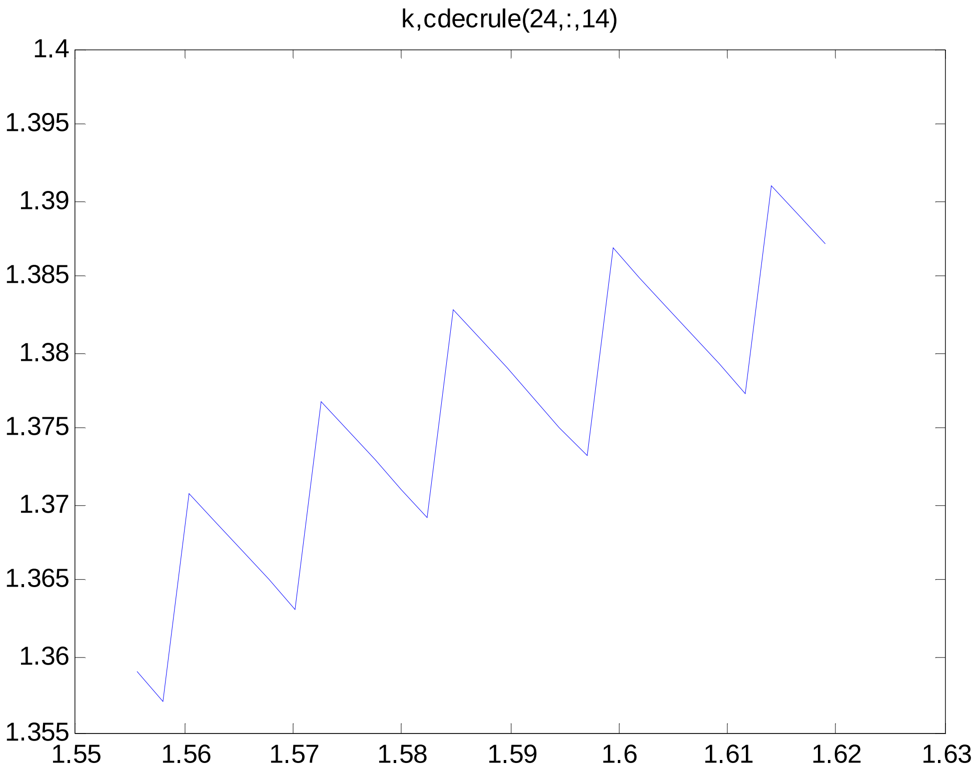
1.61
1.62
1.63


k,cdecrule(23,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(24,:,14)
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1.39
1.385
1.38
1.375
1.37
1.365
1.36
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1.55
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1.57
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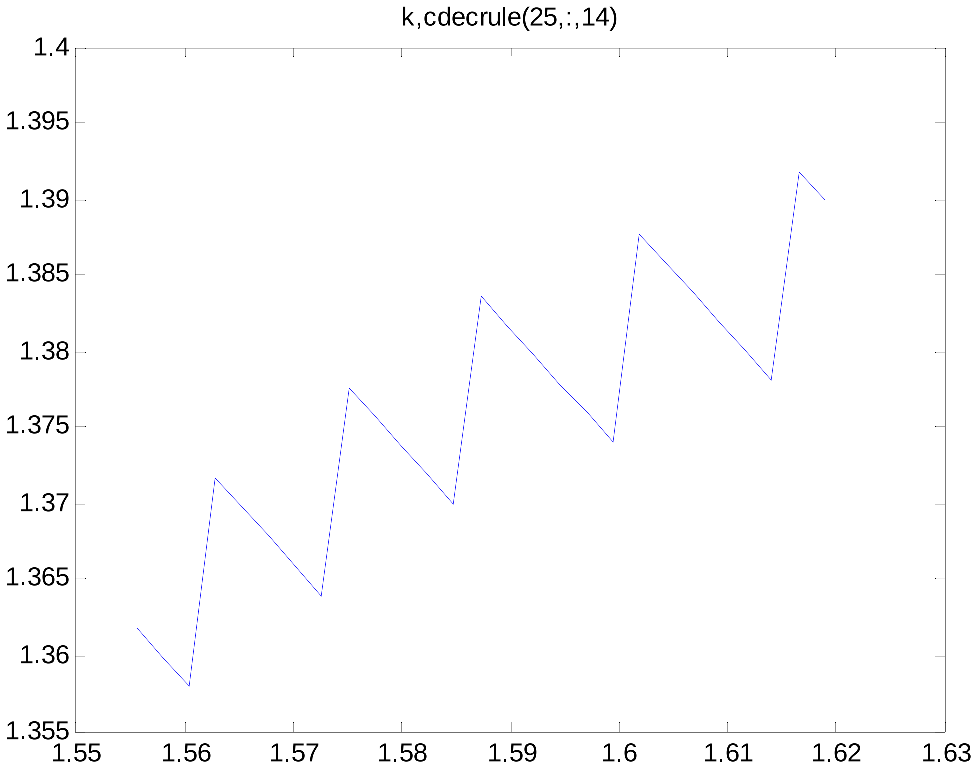
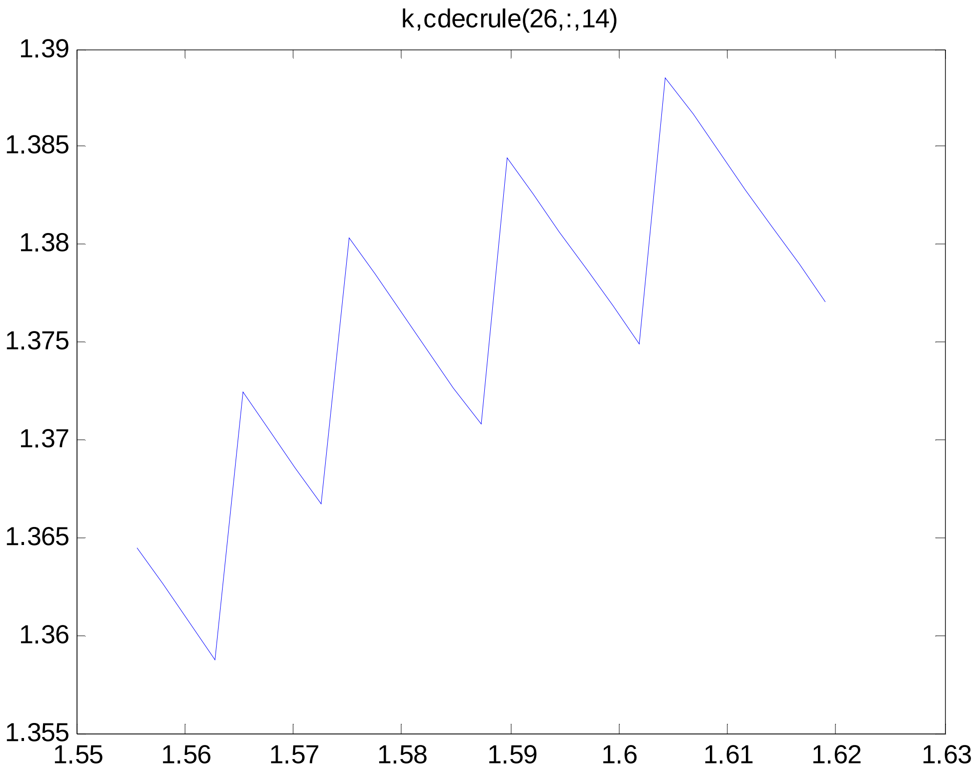
1.6
1.61
1.62
1.63


k,cdecrule(25,:,14)
1.4
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,cdecrule(26,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.55
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1.57
1.58
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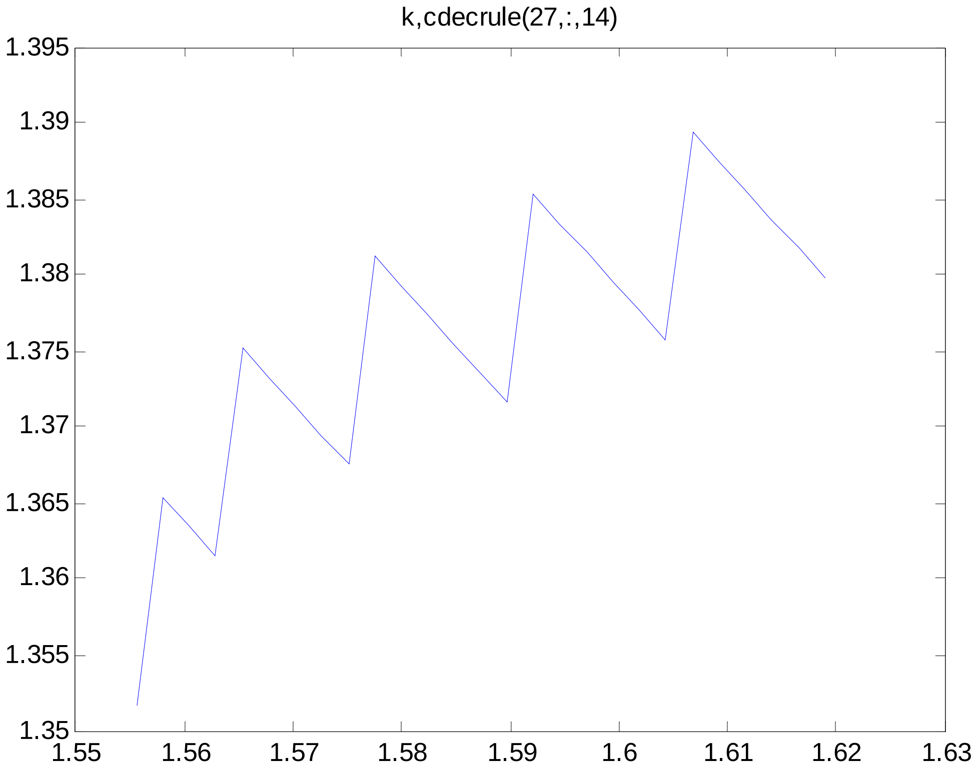
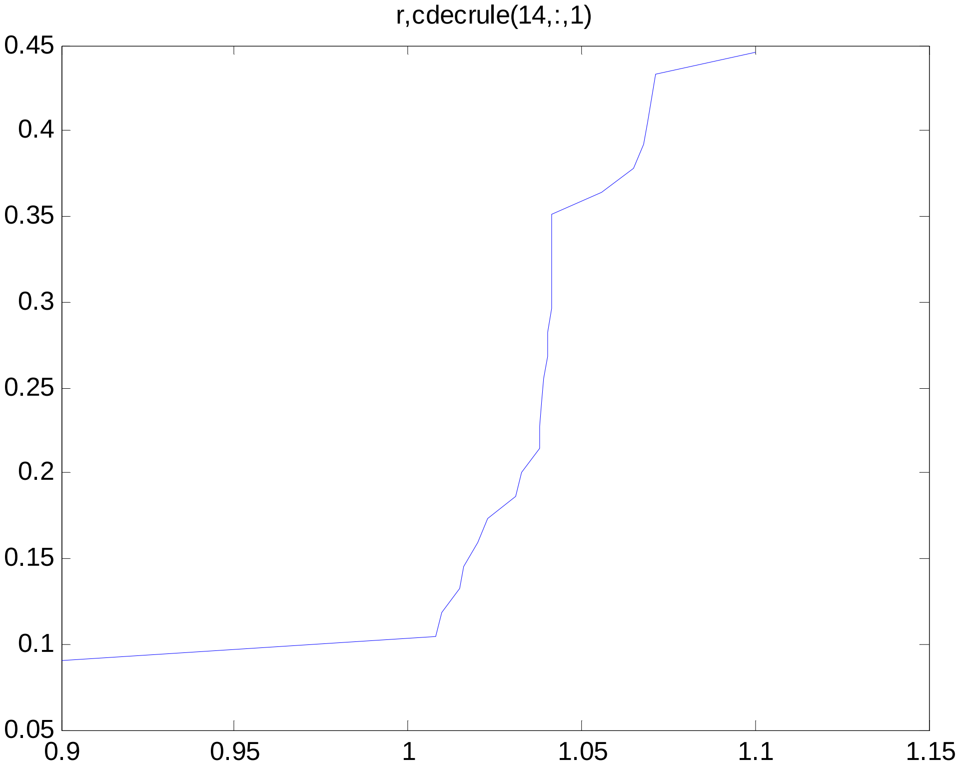
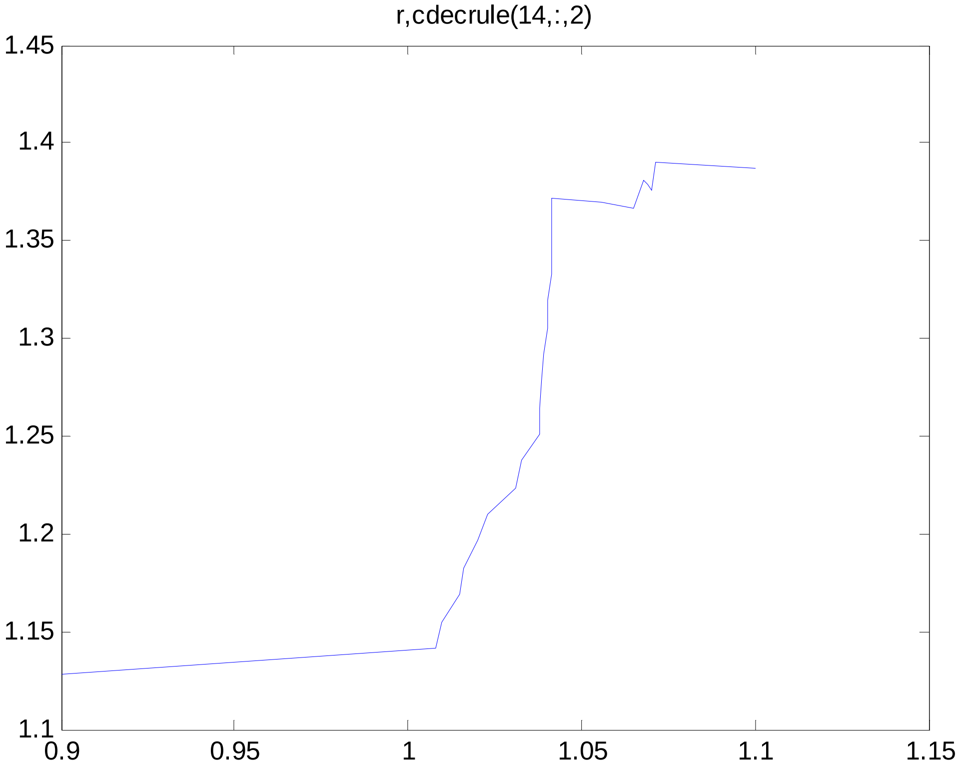
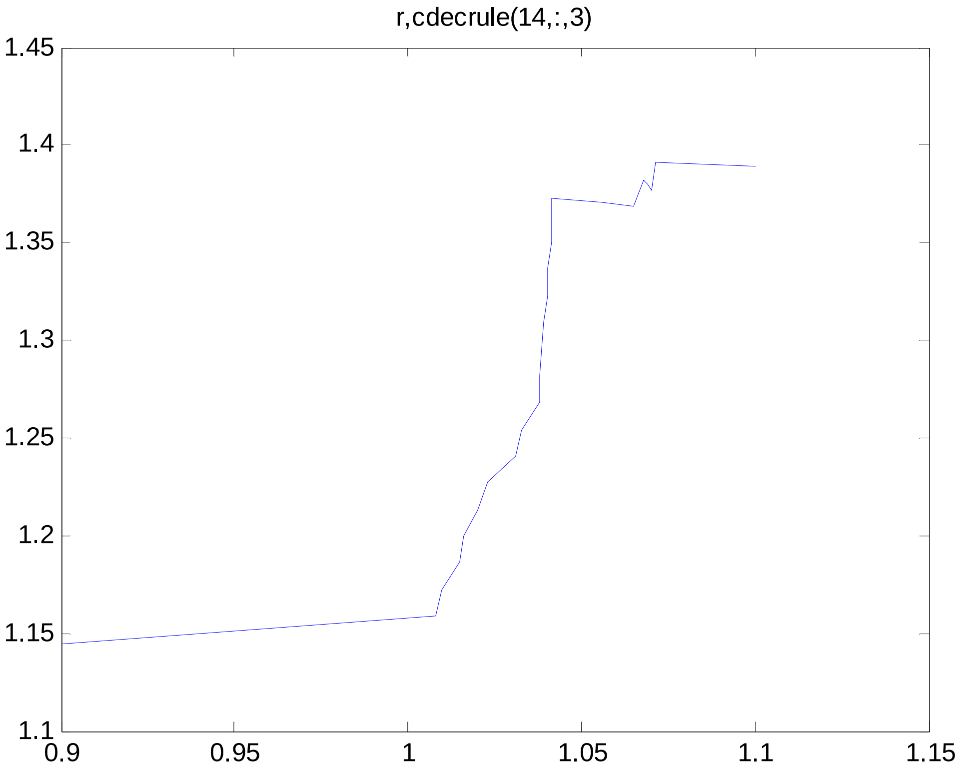
1.61
1.62
1.63

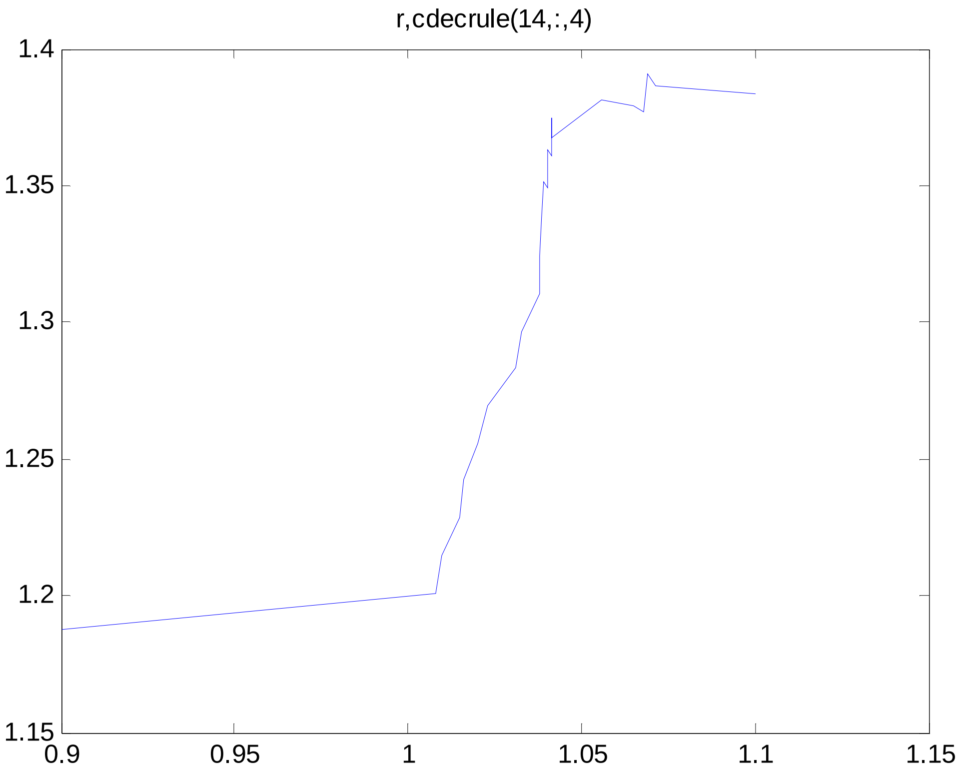

k,cdecrule(27,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

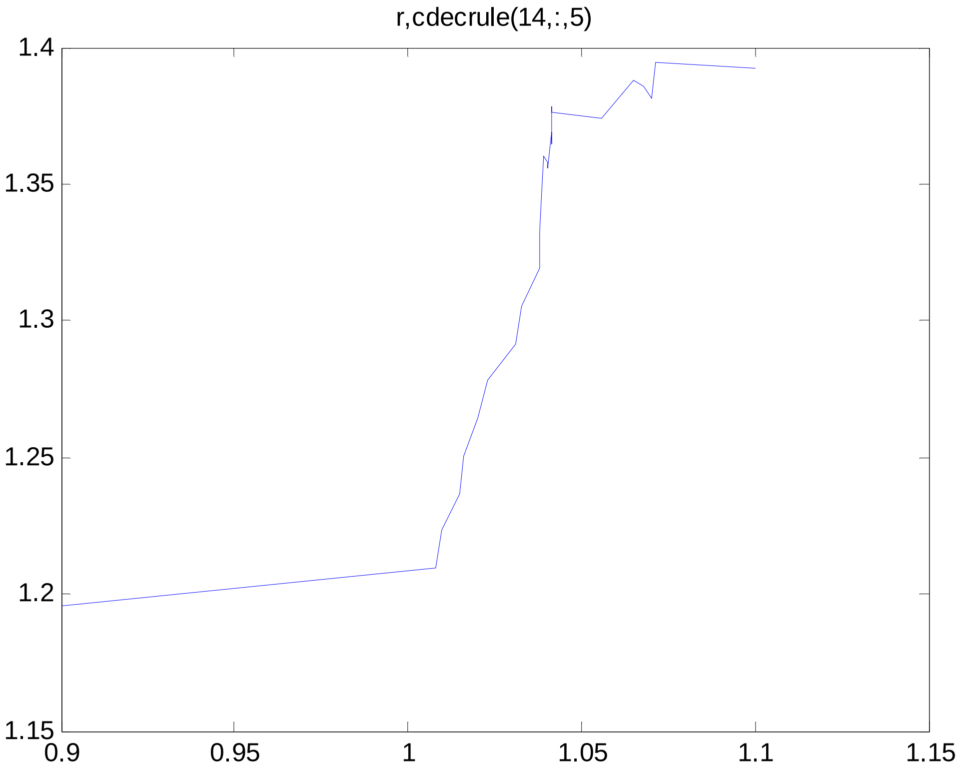
Case_7


r,cdecrule(14,:,1)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,2)
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,3)
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,4)
1.4
1.35
1.3
1.25
1.2
1.15
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,5)
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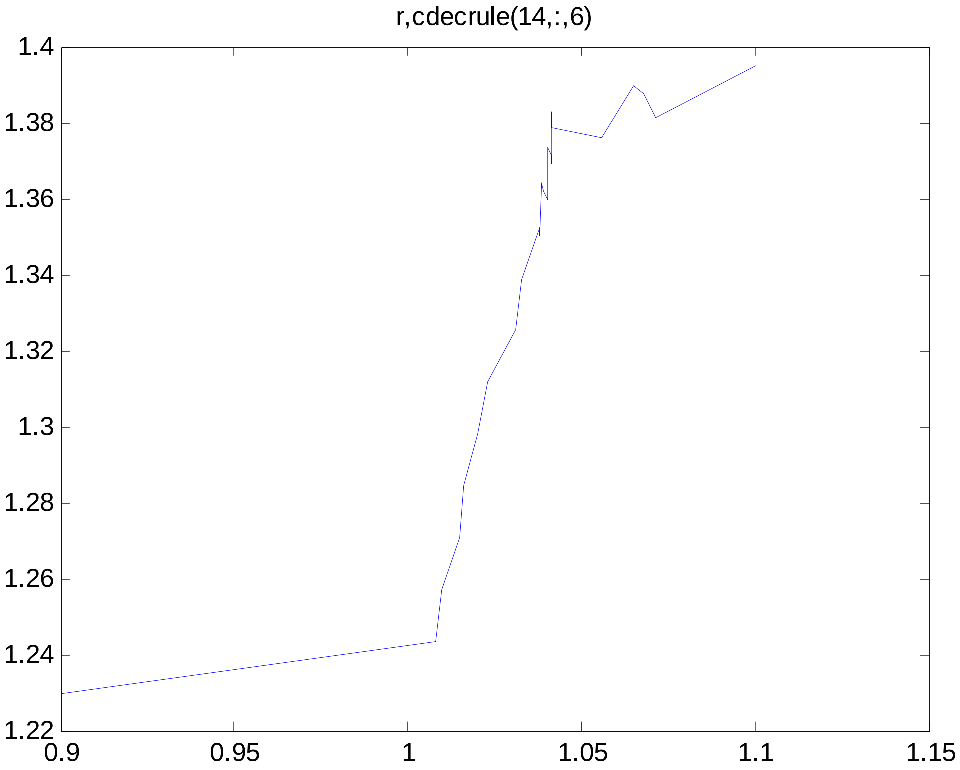
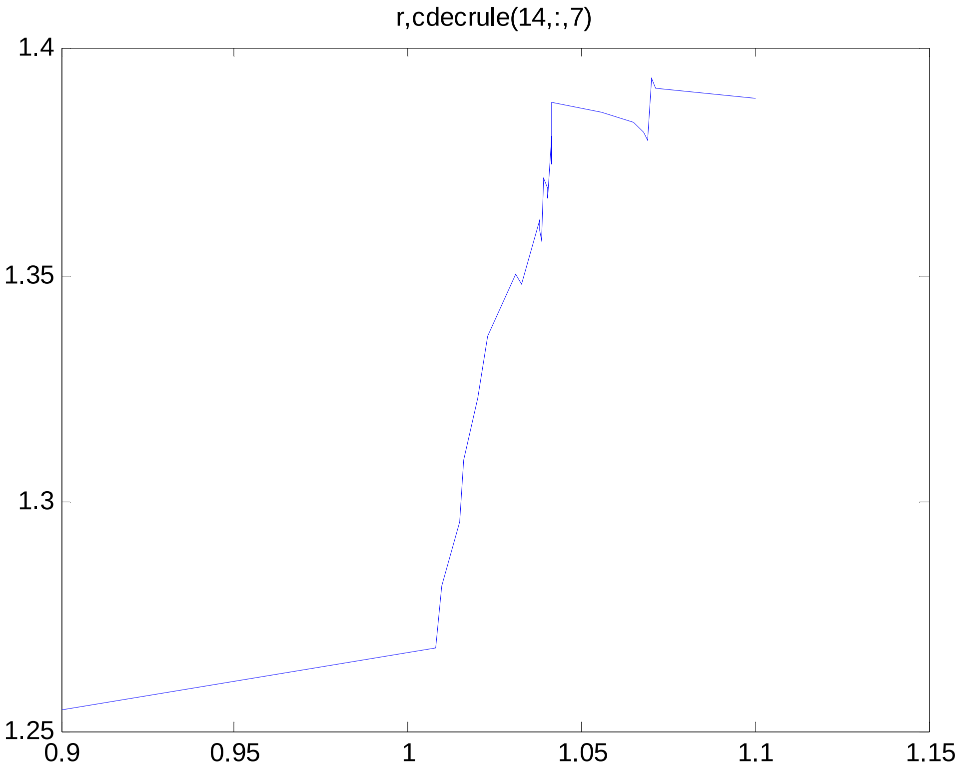
1.35
1.3
1.25
1.2
1.15
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,6)
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,7)
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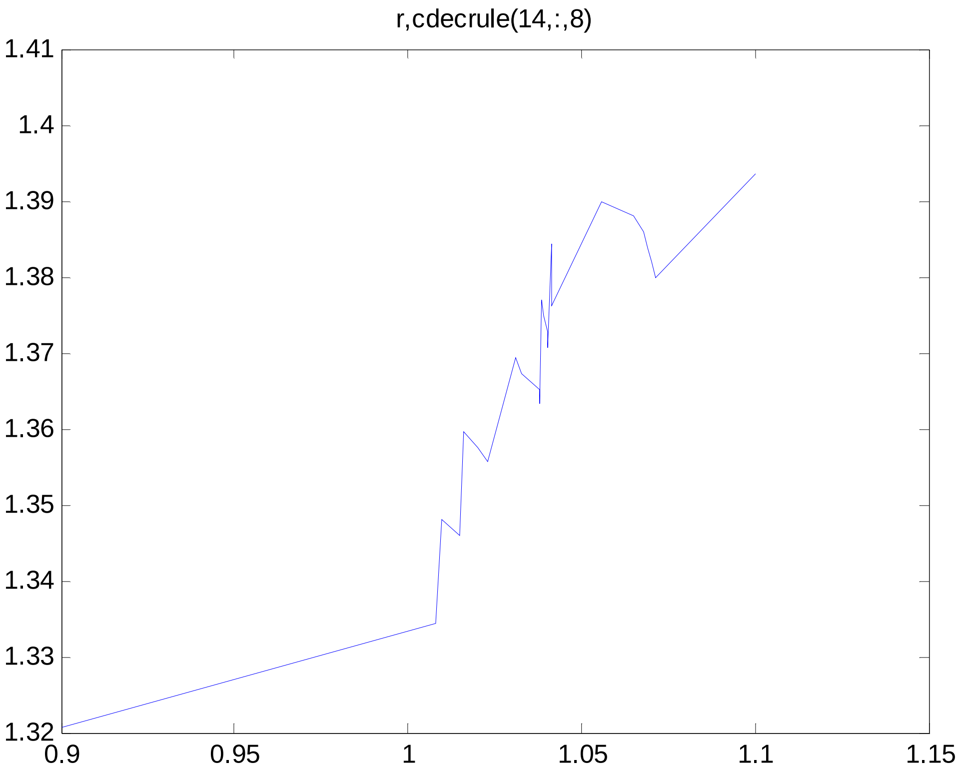
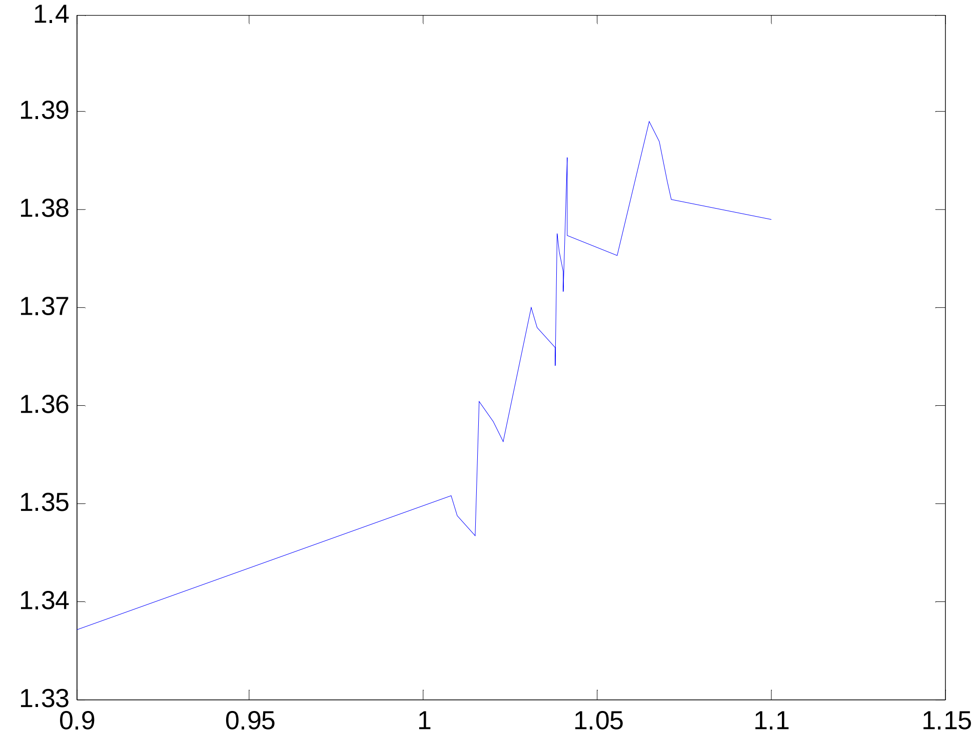
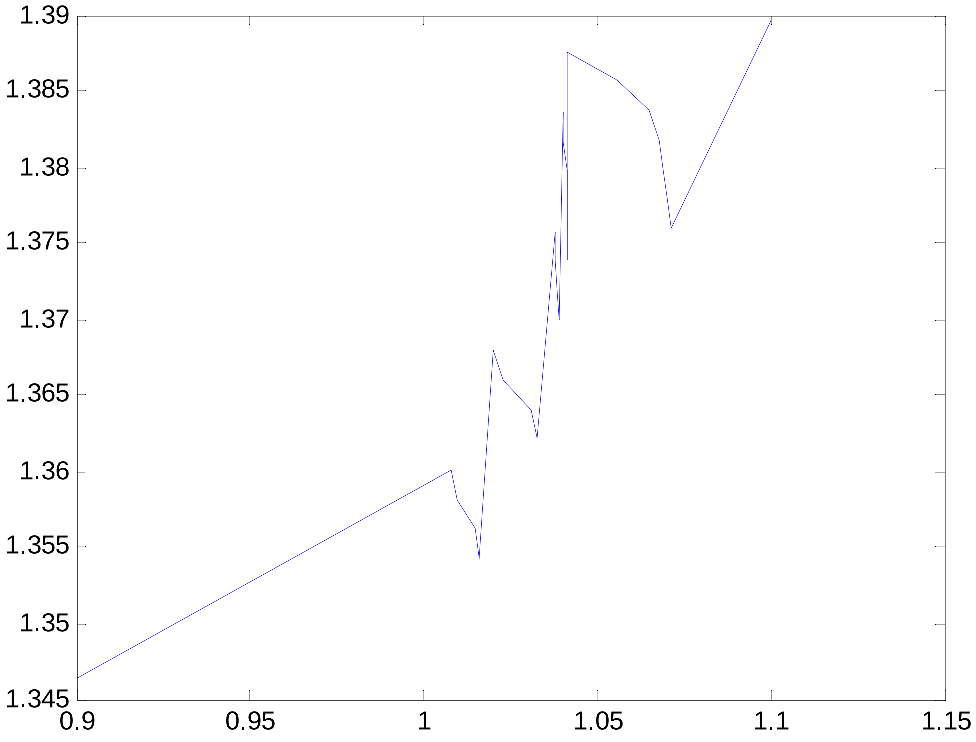
1.3
1.25
0.9
0.95
1
1.05
1.1
1.15

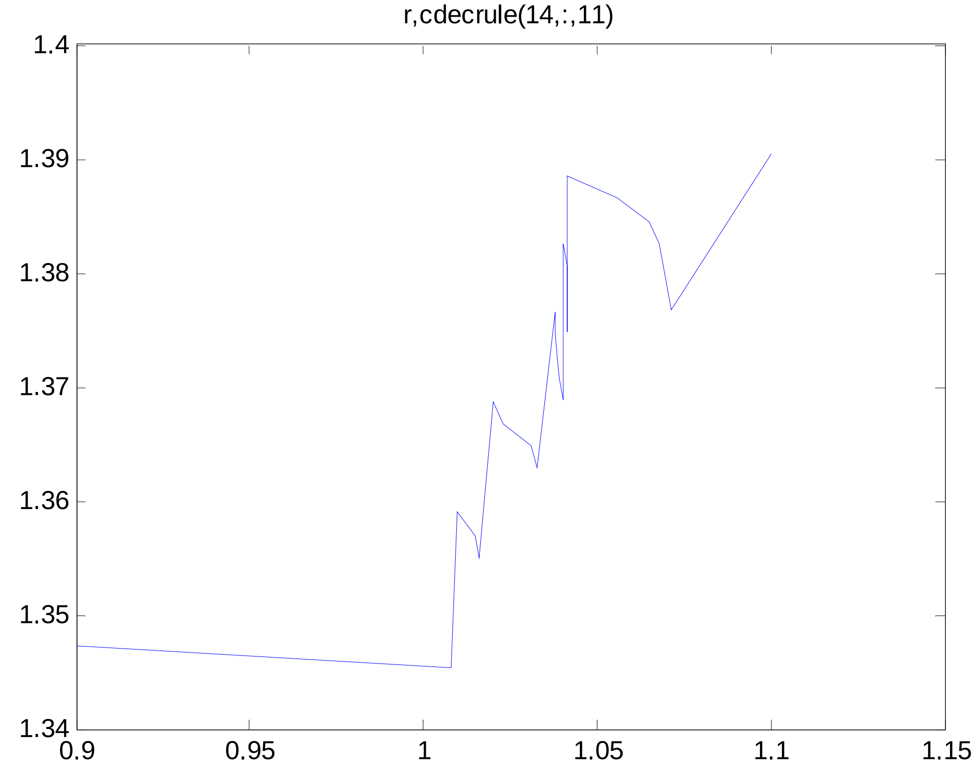

r,cdecrule(14,:,8)
1.41
1.4
1.39
1.38
1.37
1.36
1.35
1.34
1.33
1.32
0.9
0.95
1
1.05
1.1
1.15

r,cdecrule(14,:,9)



r,cdecrule(14,:,10)




r,cdecrule(14,:,11)
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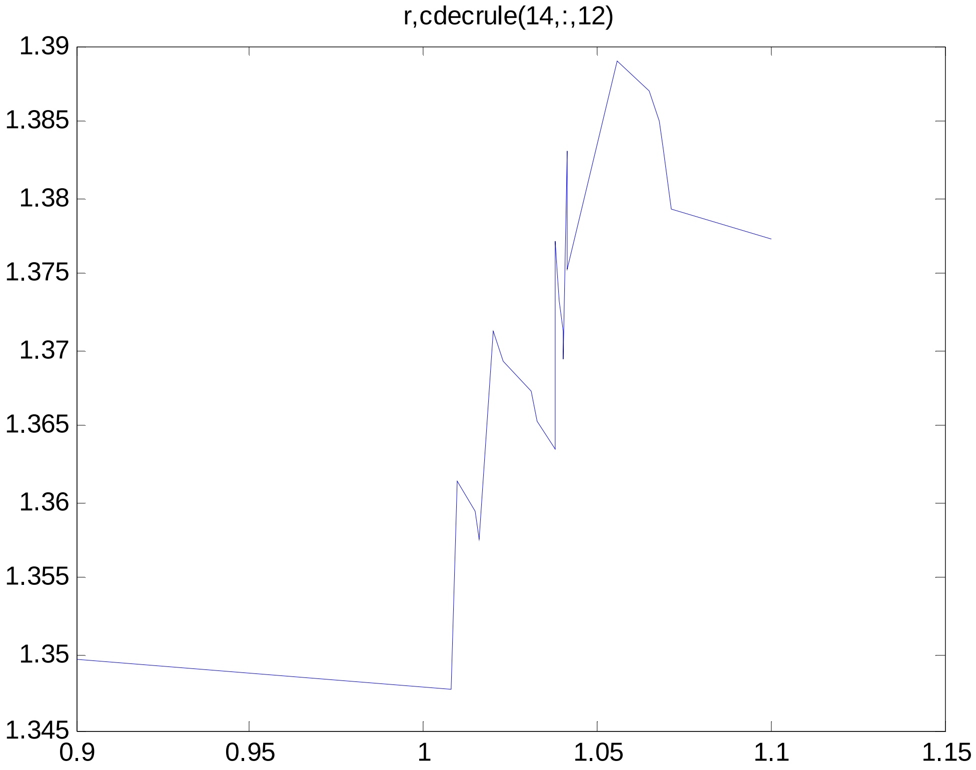
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,12)
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1.385
1.38
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1.37
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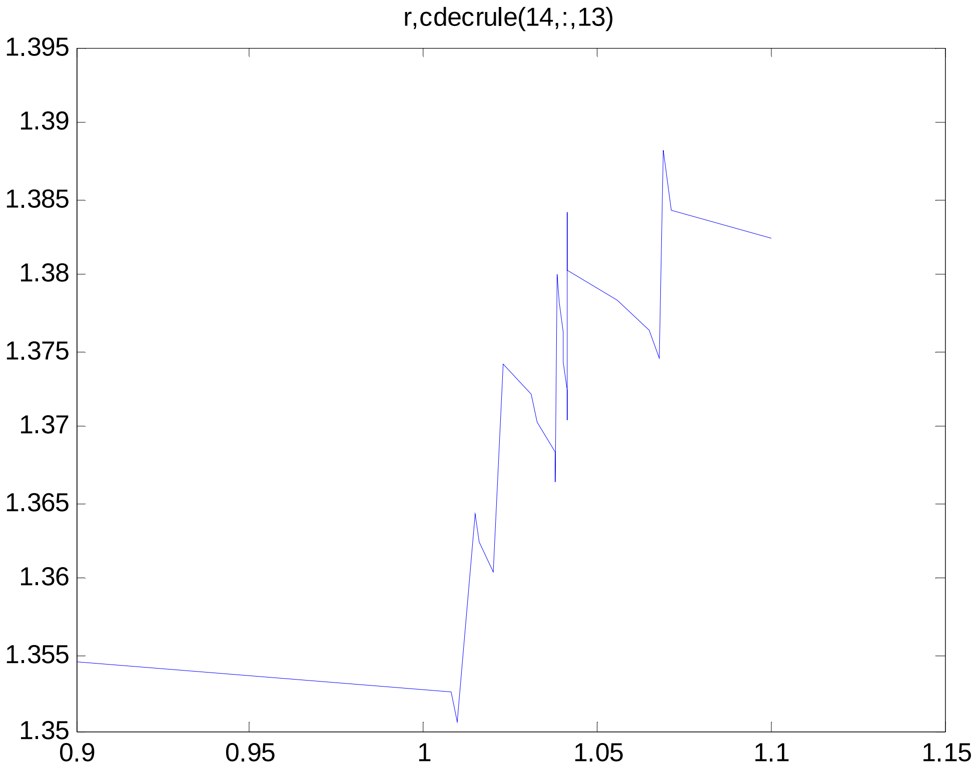
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,13)
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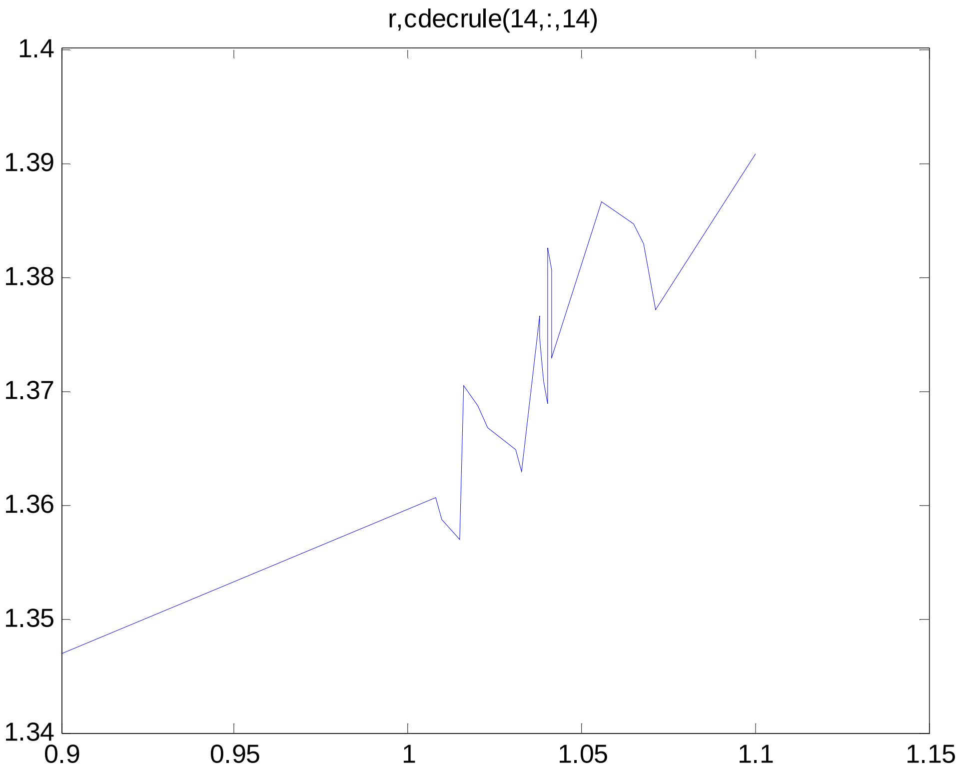
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,14)
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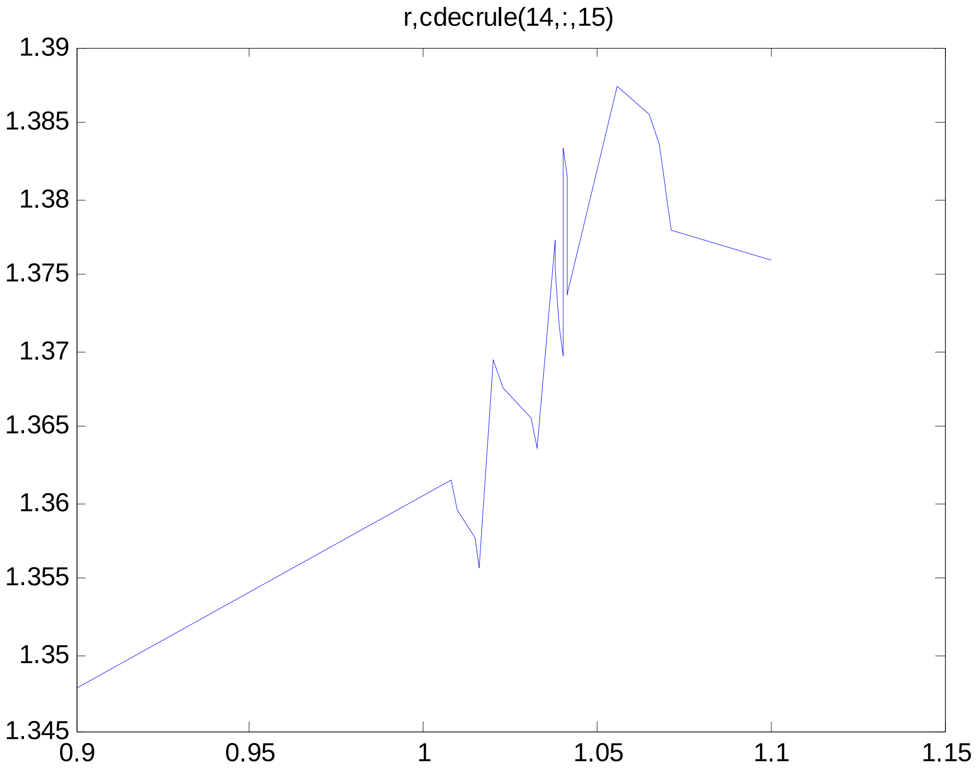
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,15)
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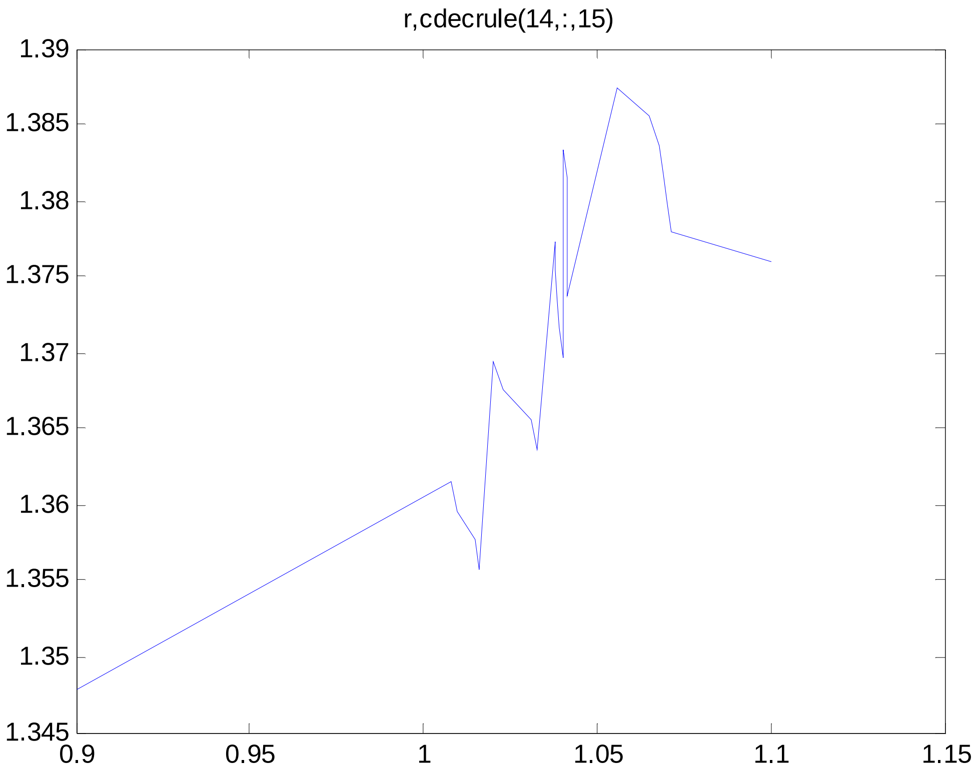
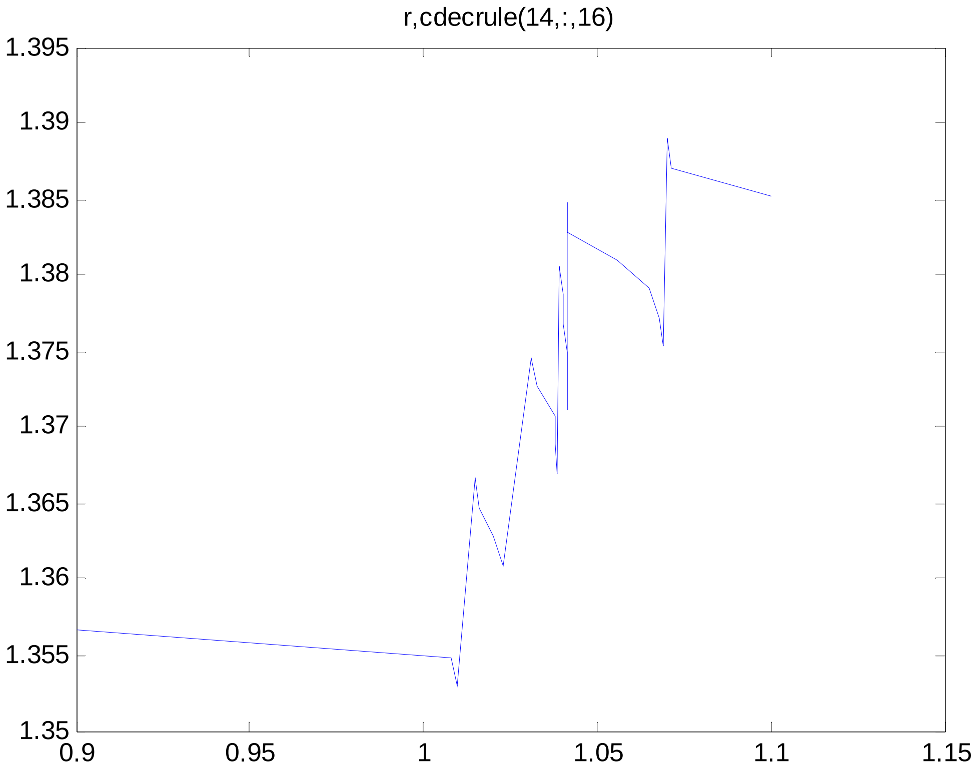
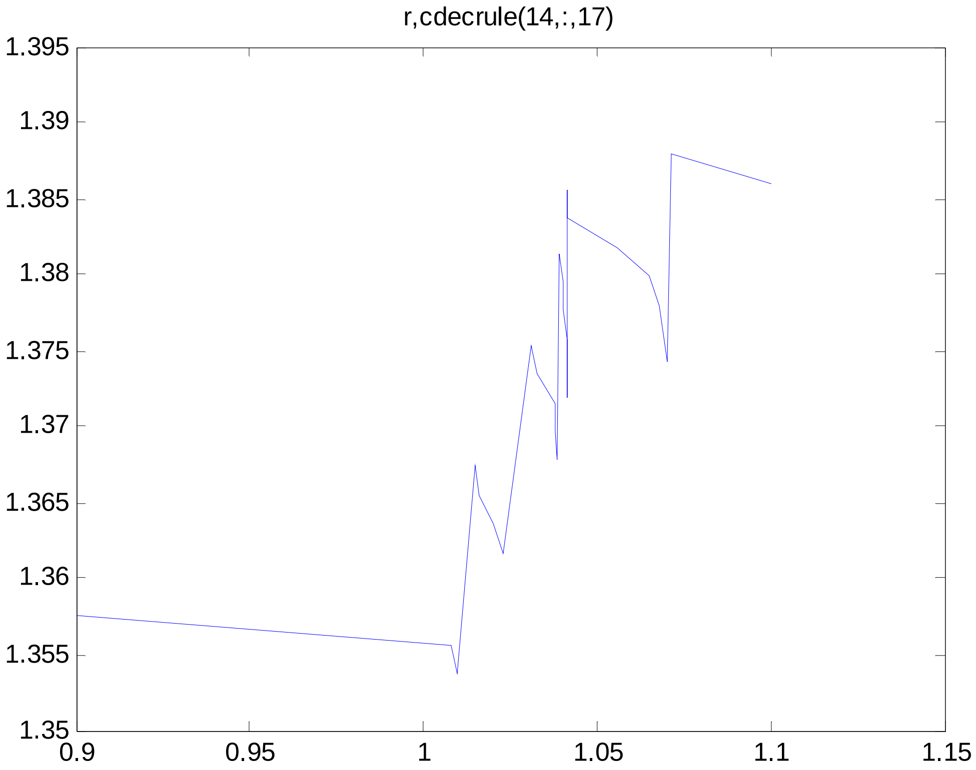
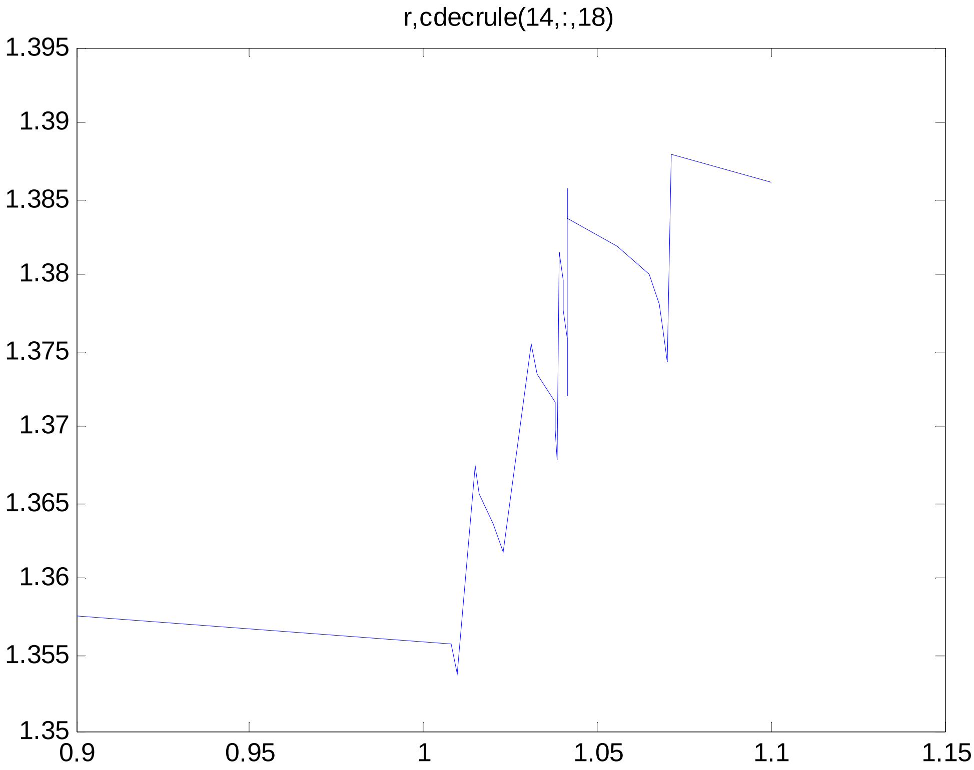
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

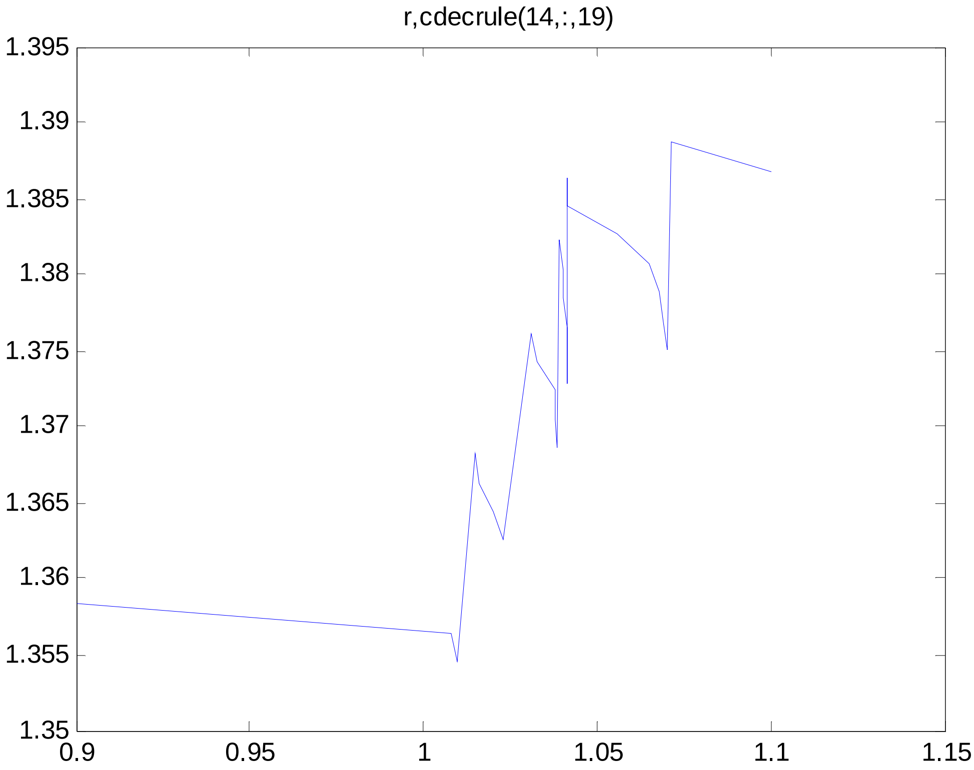

r,cdecrule(14,:,15)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,16)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

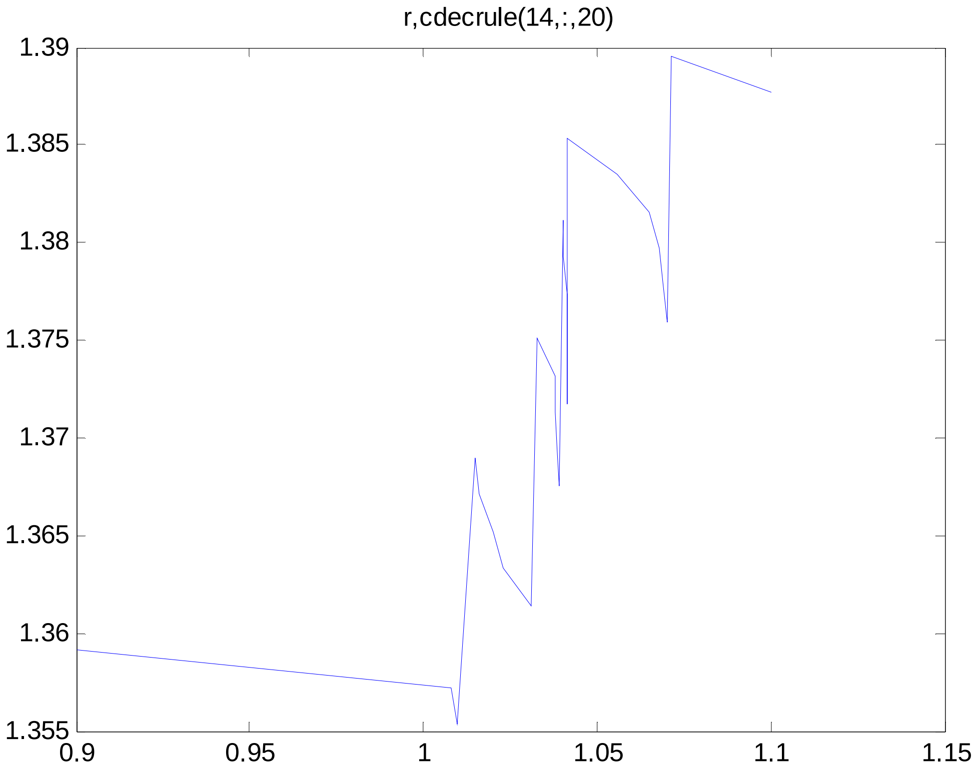

r,cdecrule(14,:,17)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

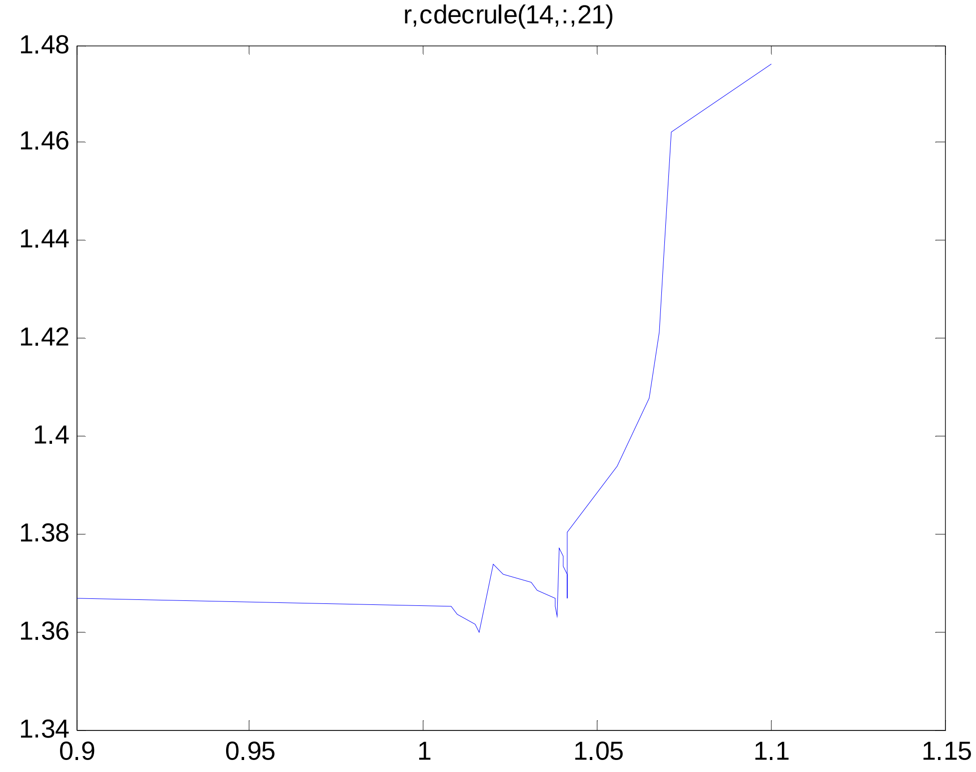


r,cdecrule(14,:,18)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15



r,cdecrule(14,:,19)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,20)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,21)
1.48
1.46
1.44
1.42
1.4
1.38
1.36
1.34
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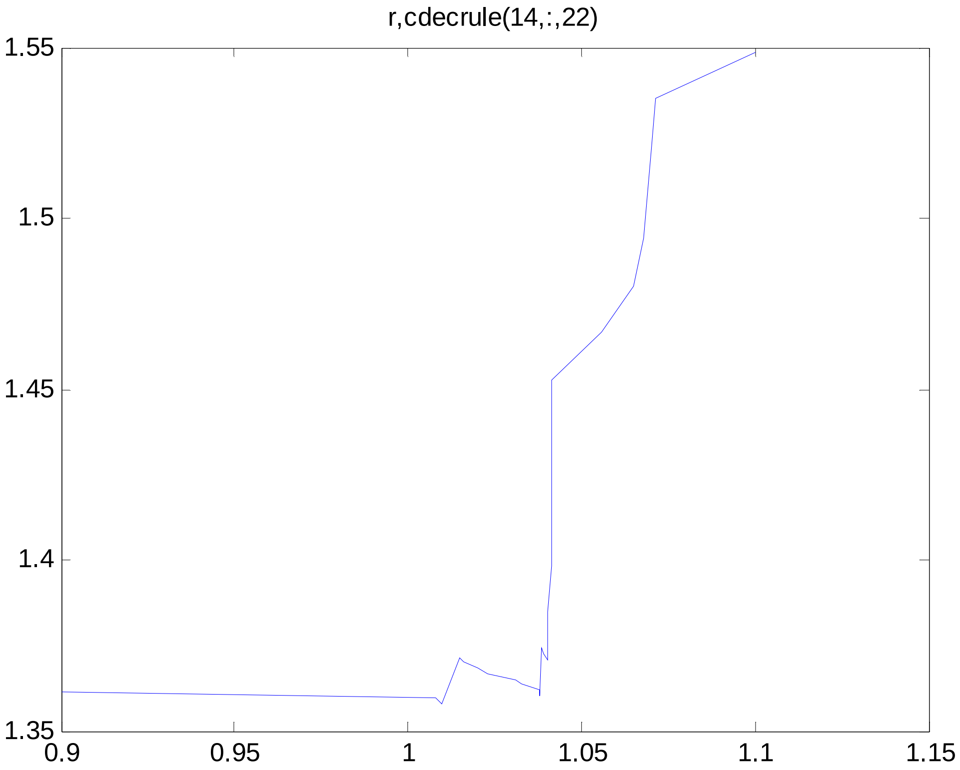
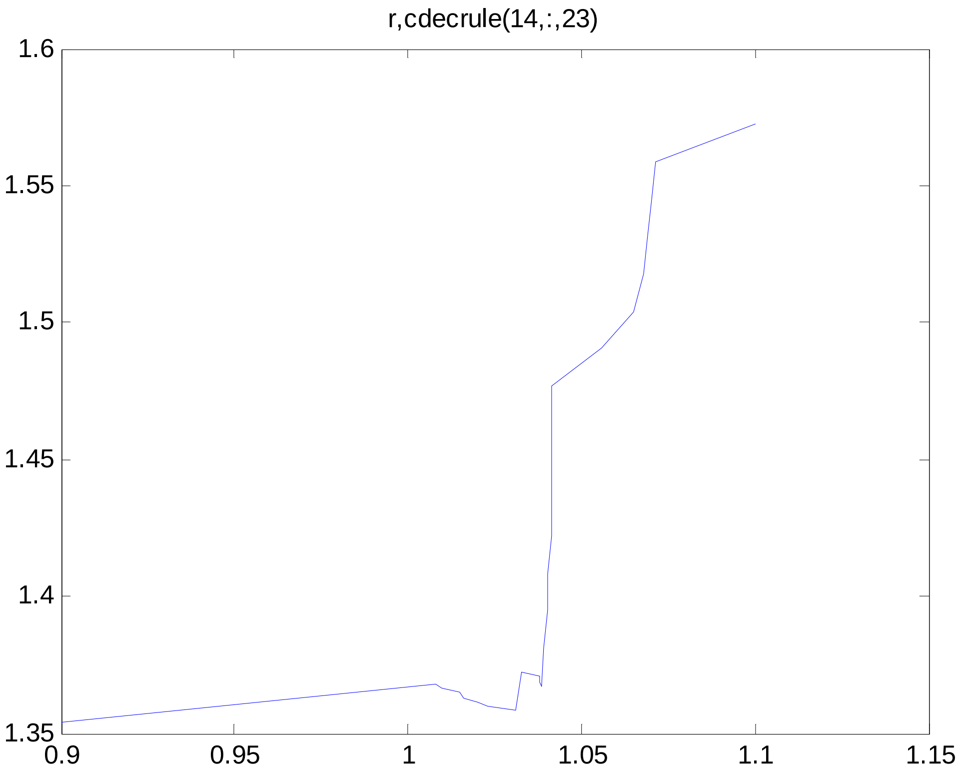
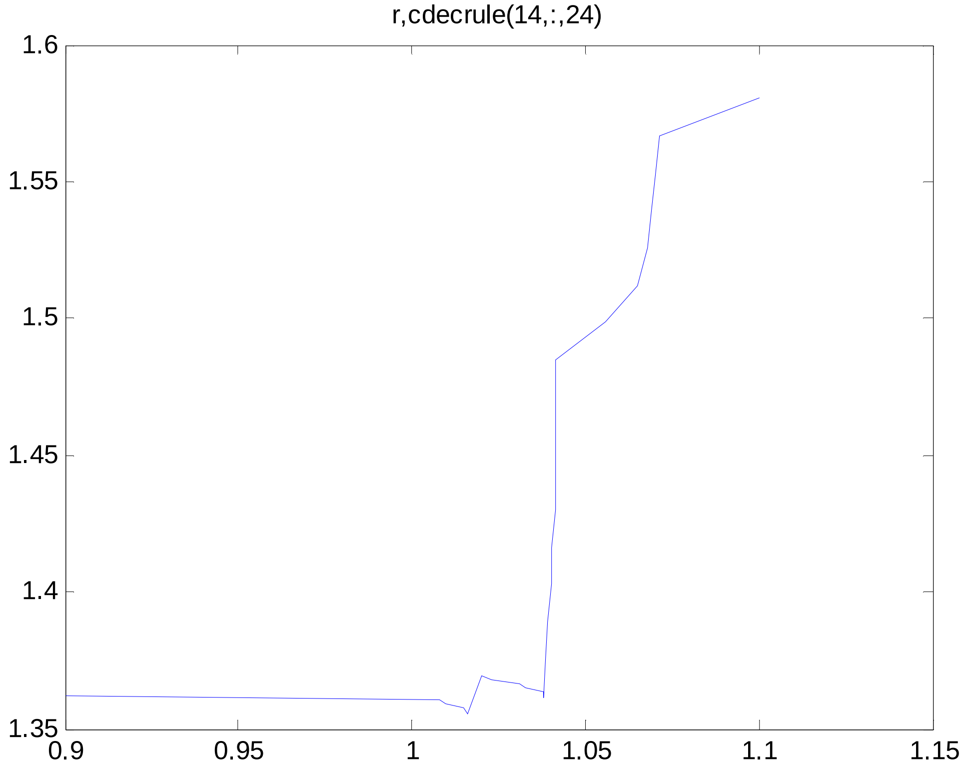
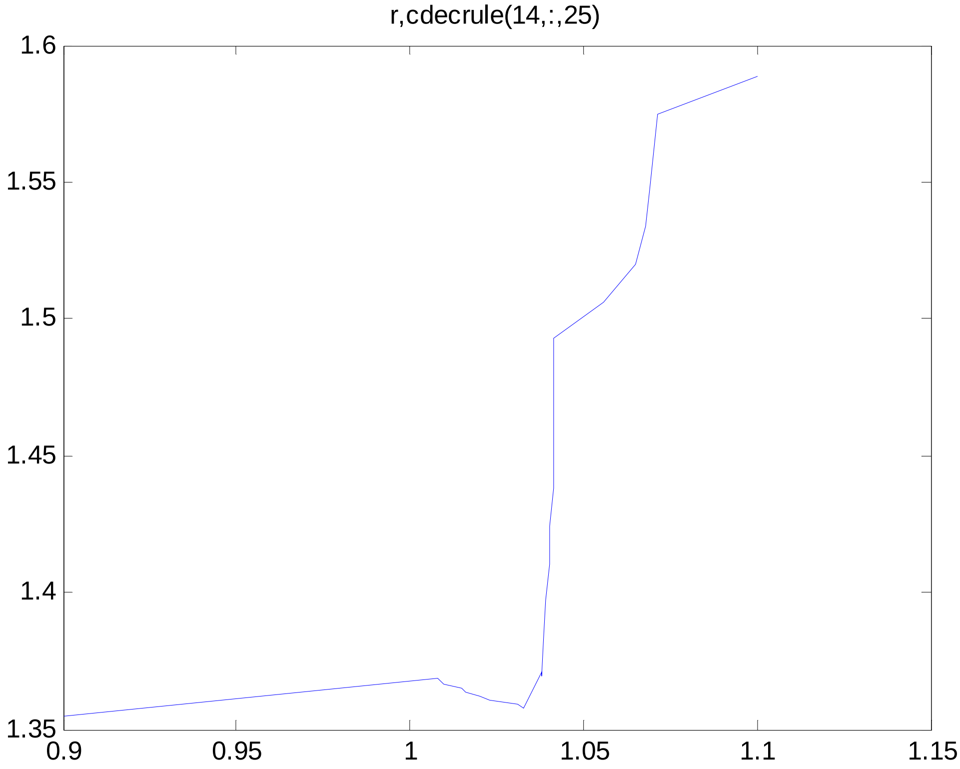
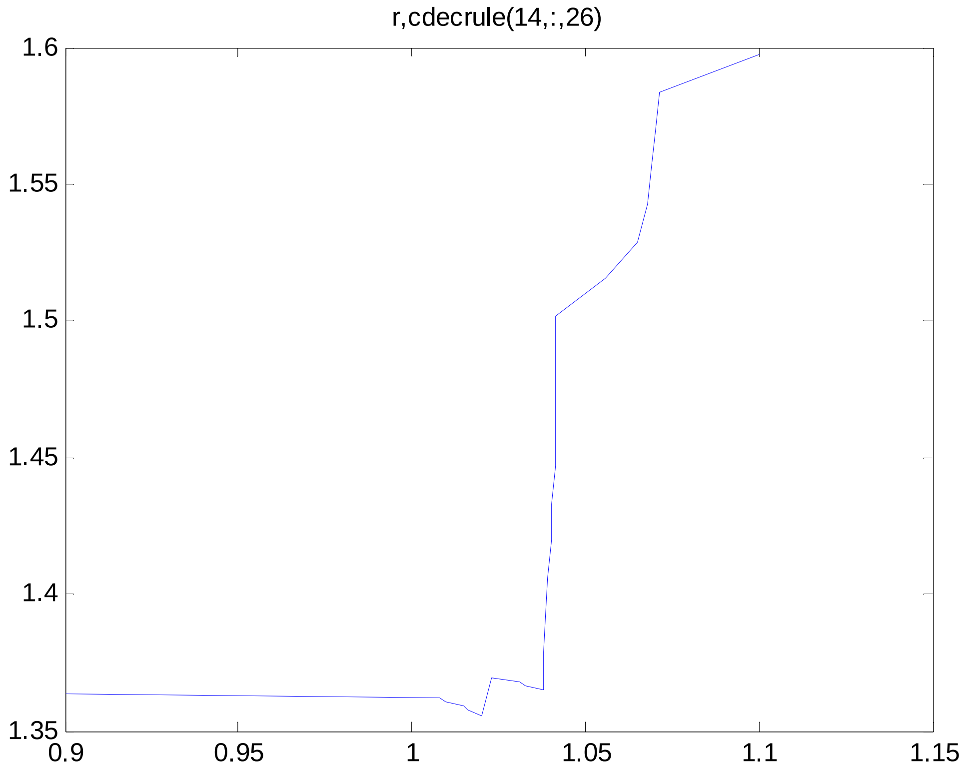
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,22)
1.55
1.5
1.45
1.4
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,23)
1.6
1.55
1.5
1.45
1.4
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,24)
1.6
1.55
1.5
1.45
1.4
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,25)
1.6
1.55
1.5
1.45
1.4
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,26)
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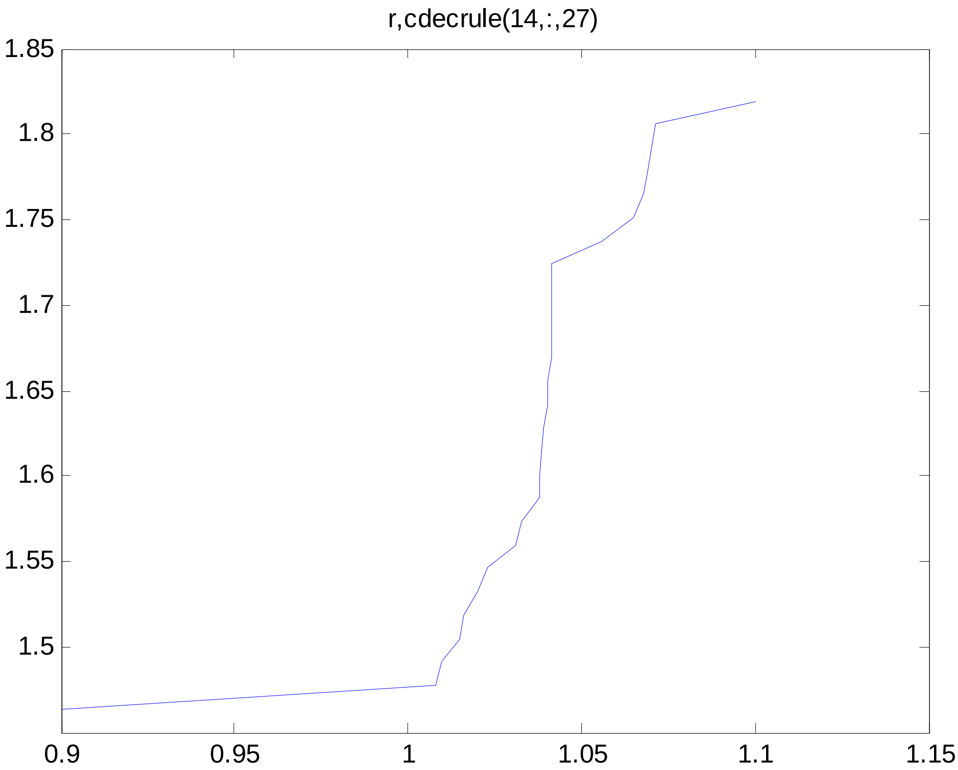
1.55
1.5
1.45
1.4
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(14,:,27)
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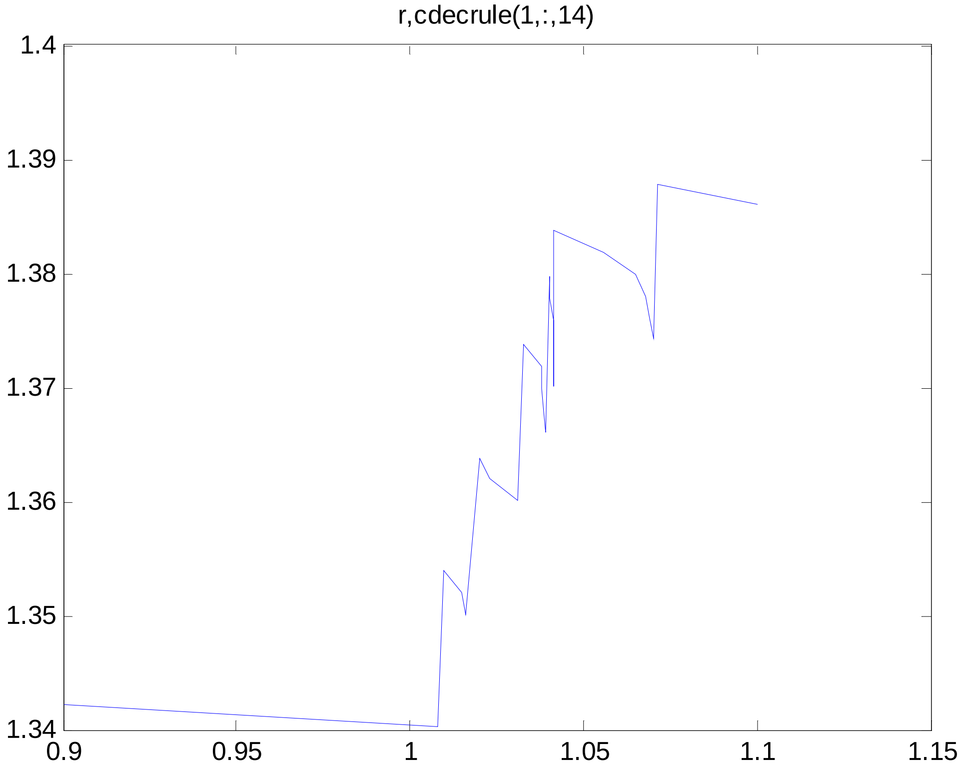
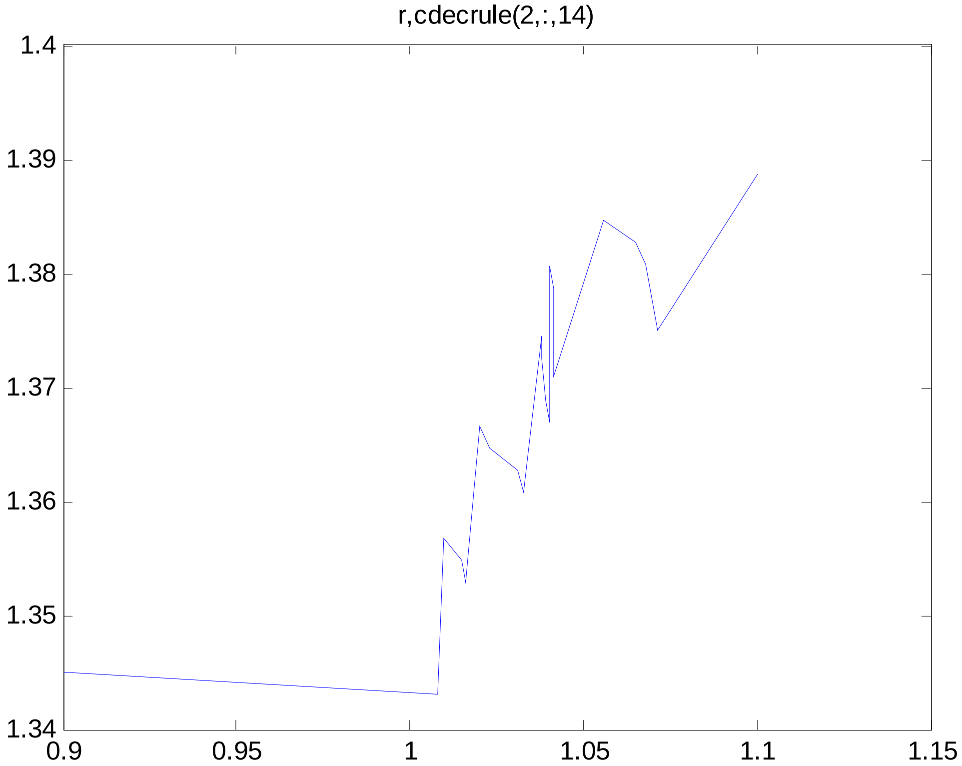
1.8
1.75
1.7
1.65
1.6
1.55
1.5
0.9
0.95
1
1.05
1.1
1.15

Case_8


r,cdecrule(1,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(2,:,14)
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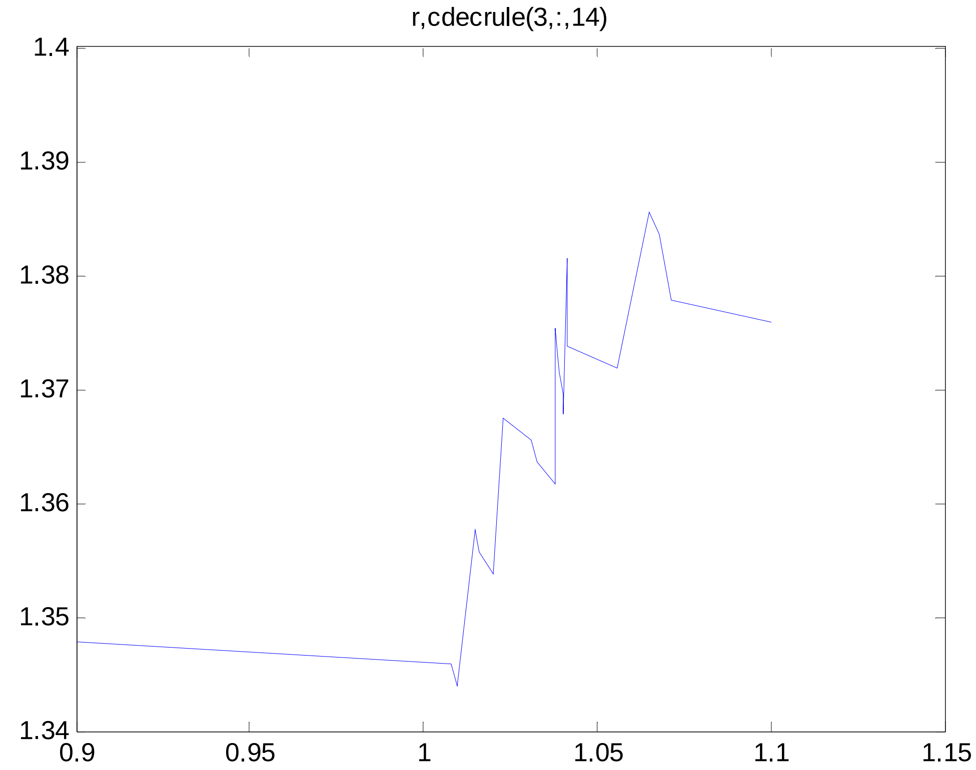
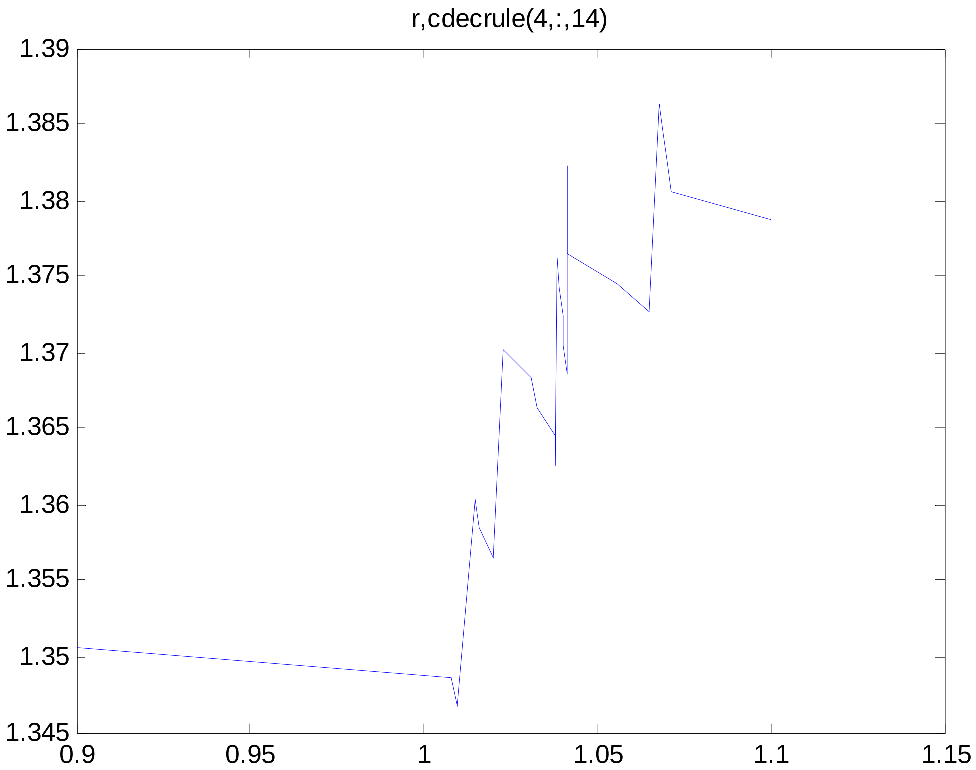
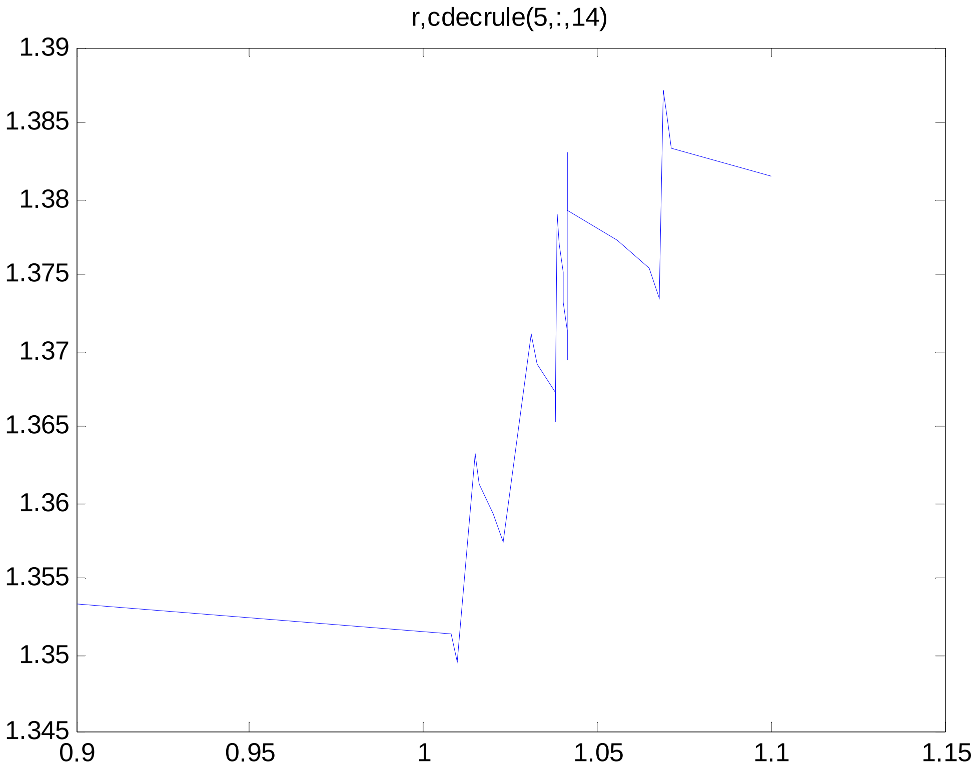
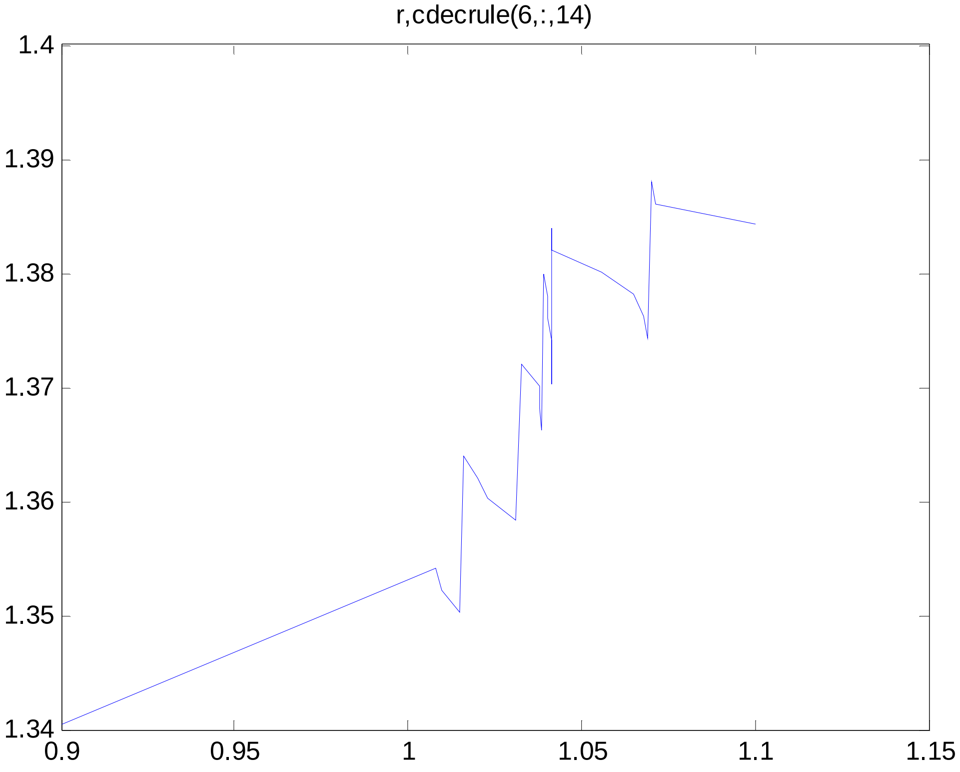
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(3,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

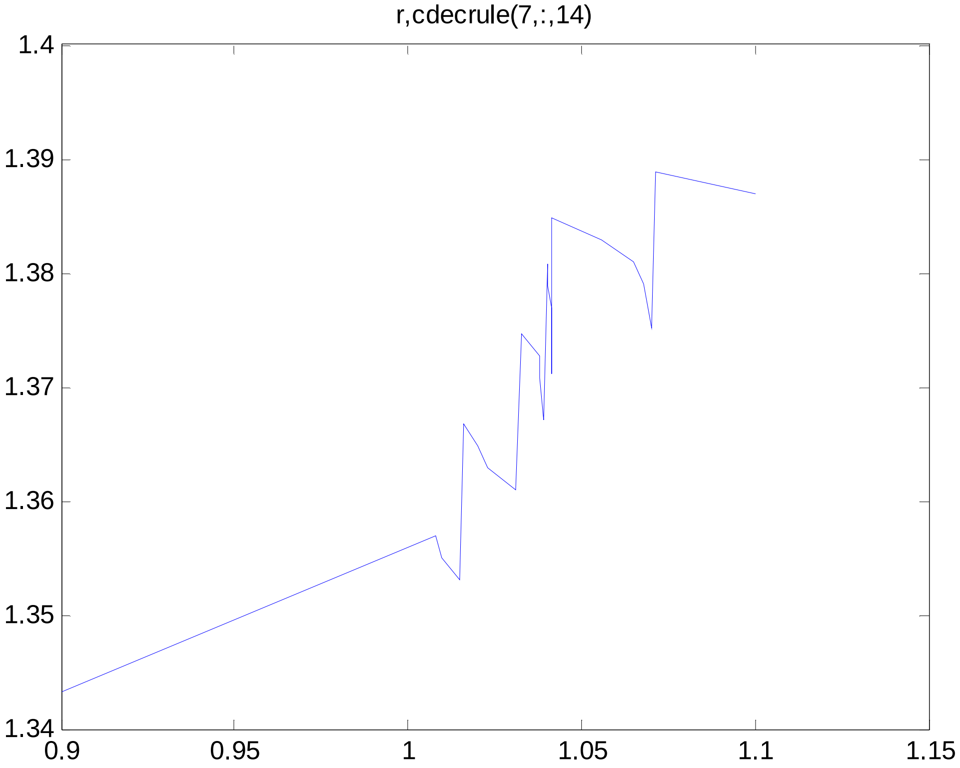

r,cdecrule(4,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

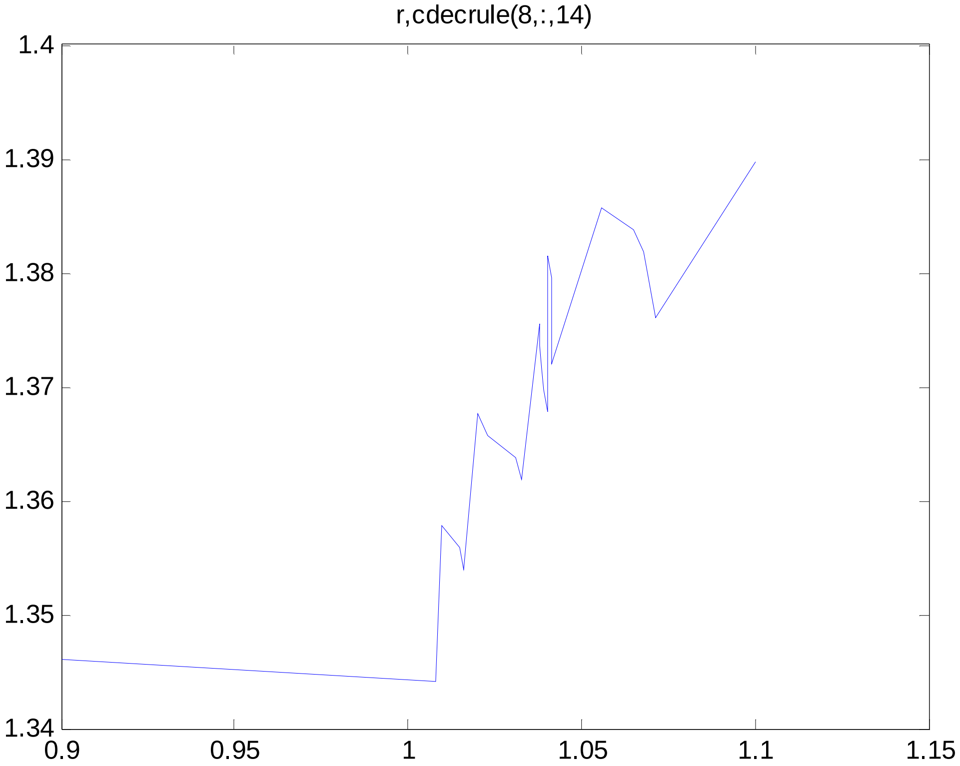


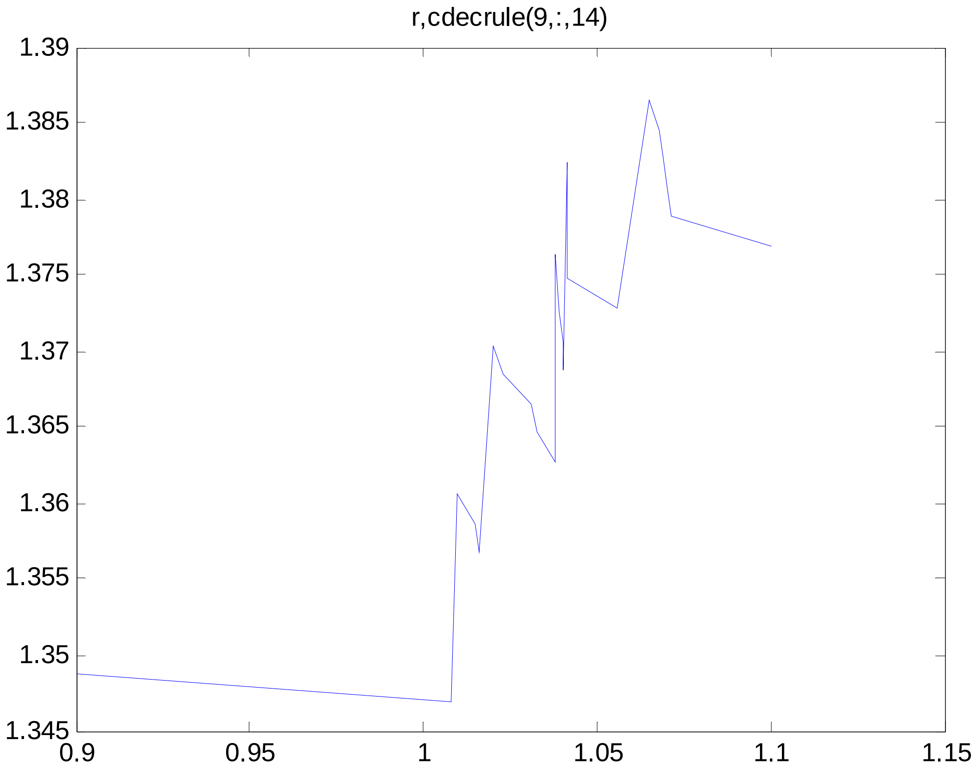
r,cdecrule(5,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

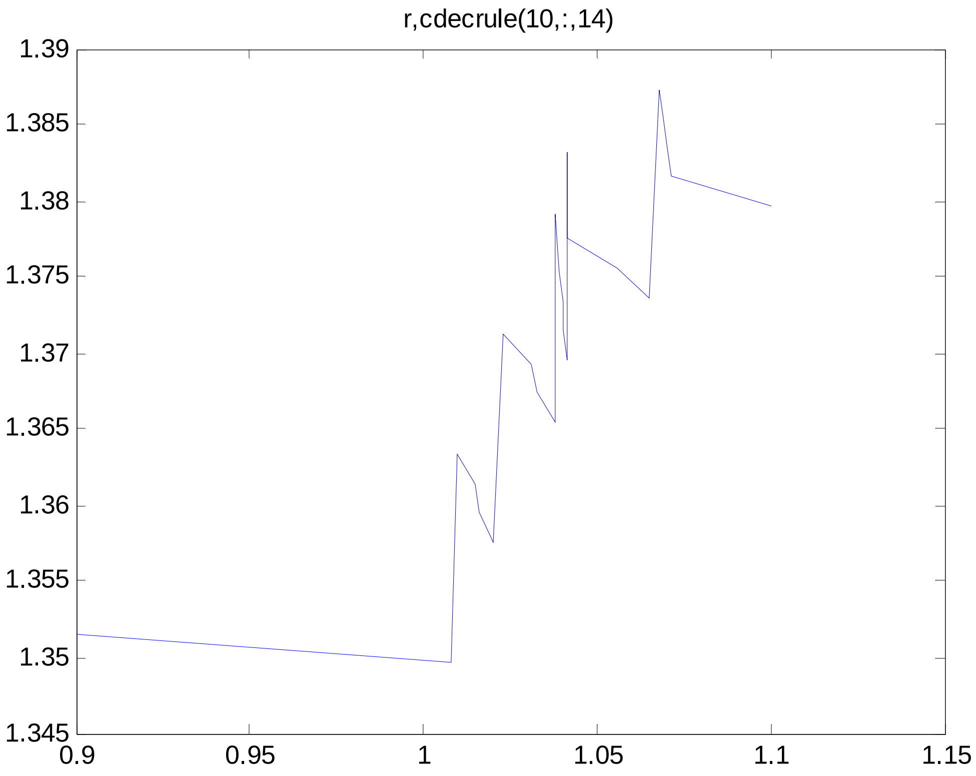


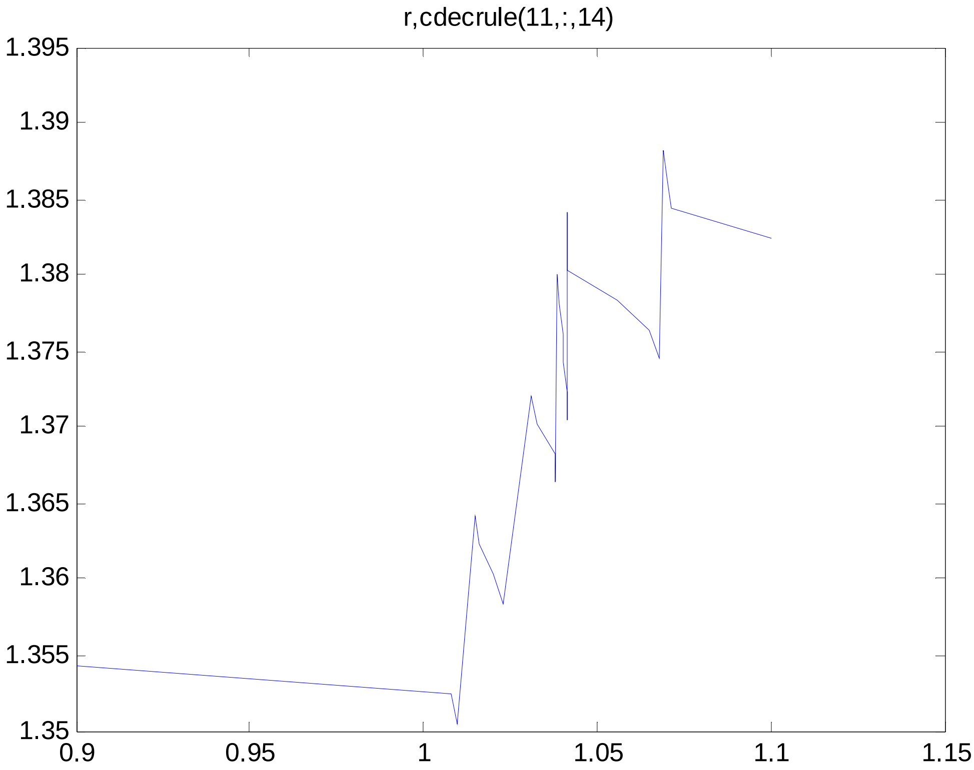
r,cdecrule(6,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

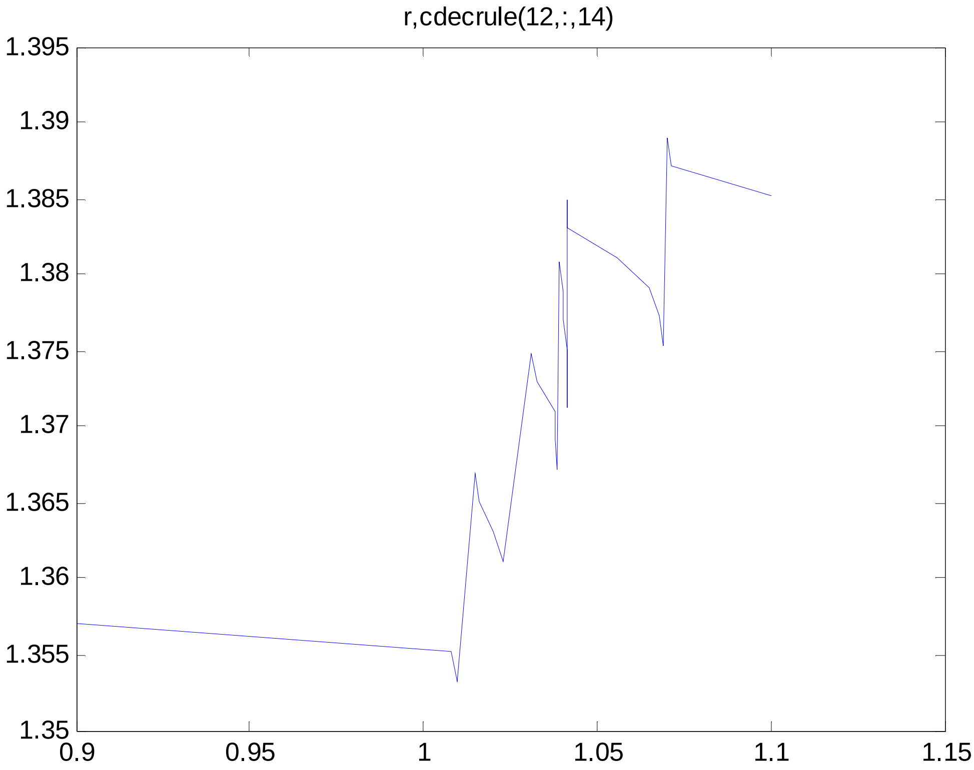

r,cdecrule(7,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

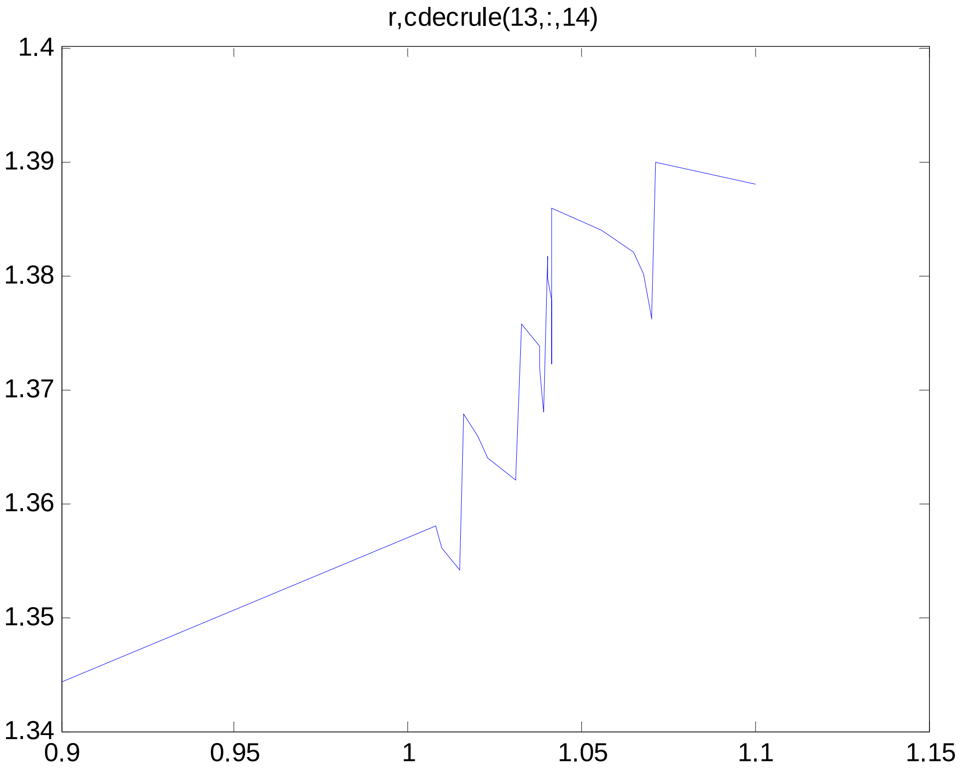

r,cdecrule(8,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

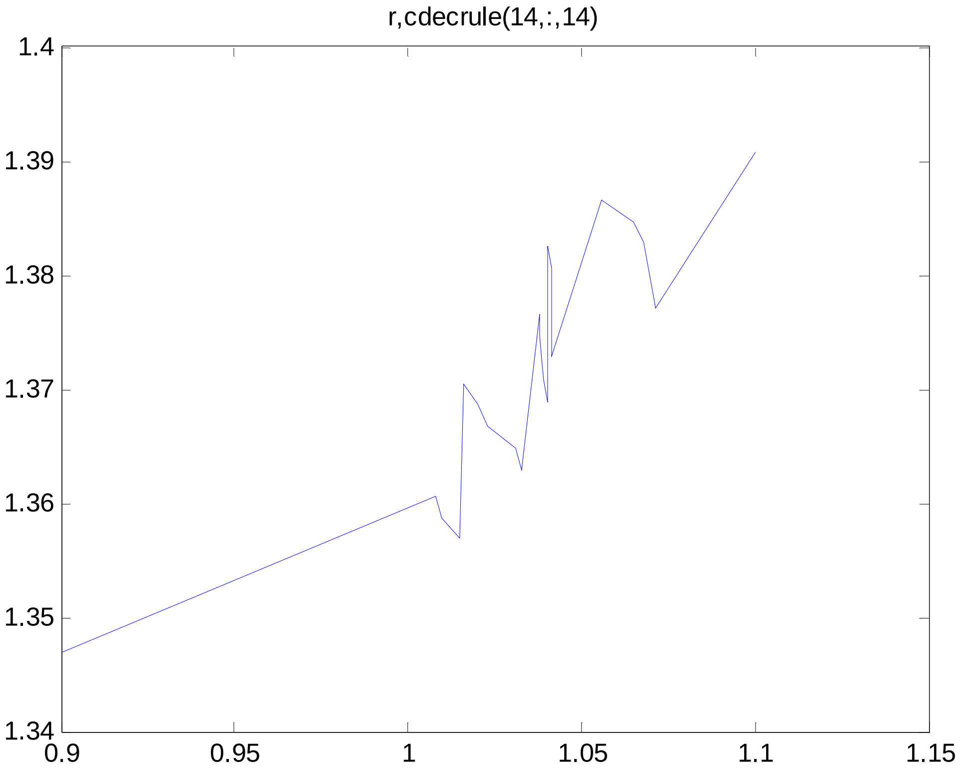

r,cdecrule(9,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

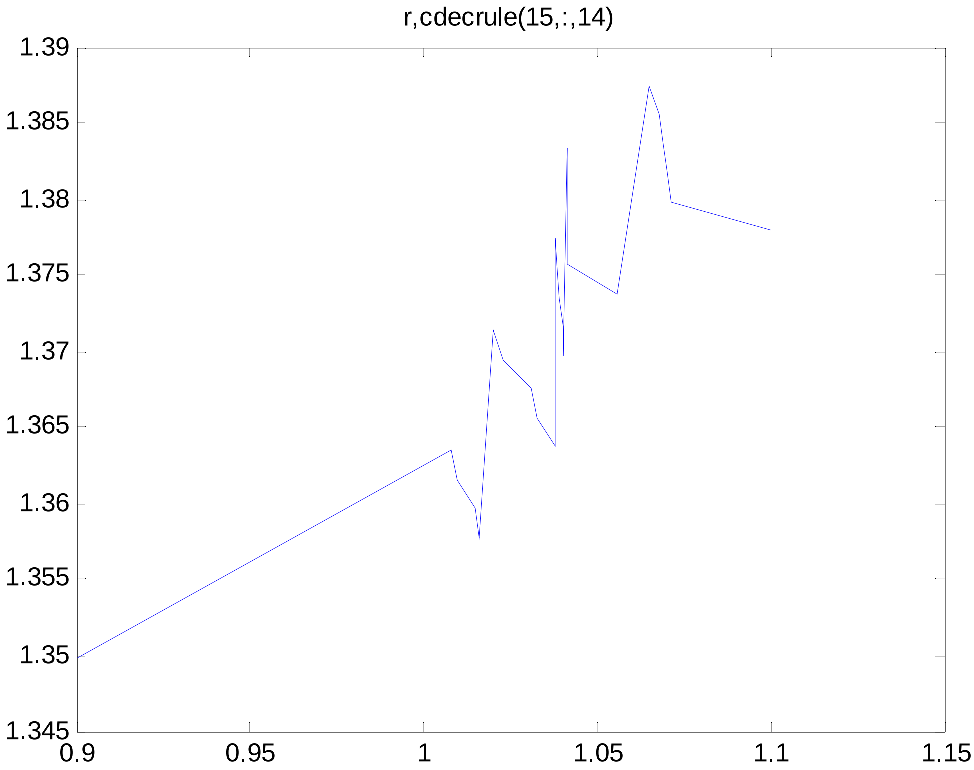

r,cdecrule(10,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

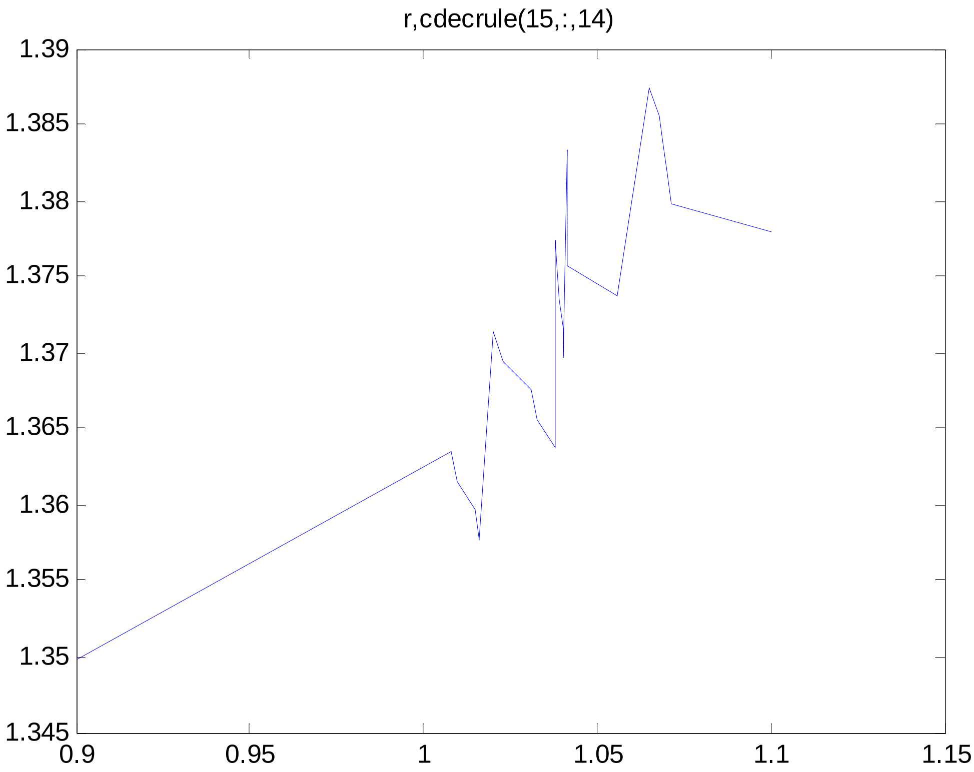

r,cdecrule(11,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

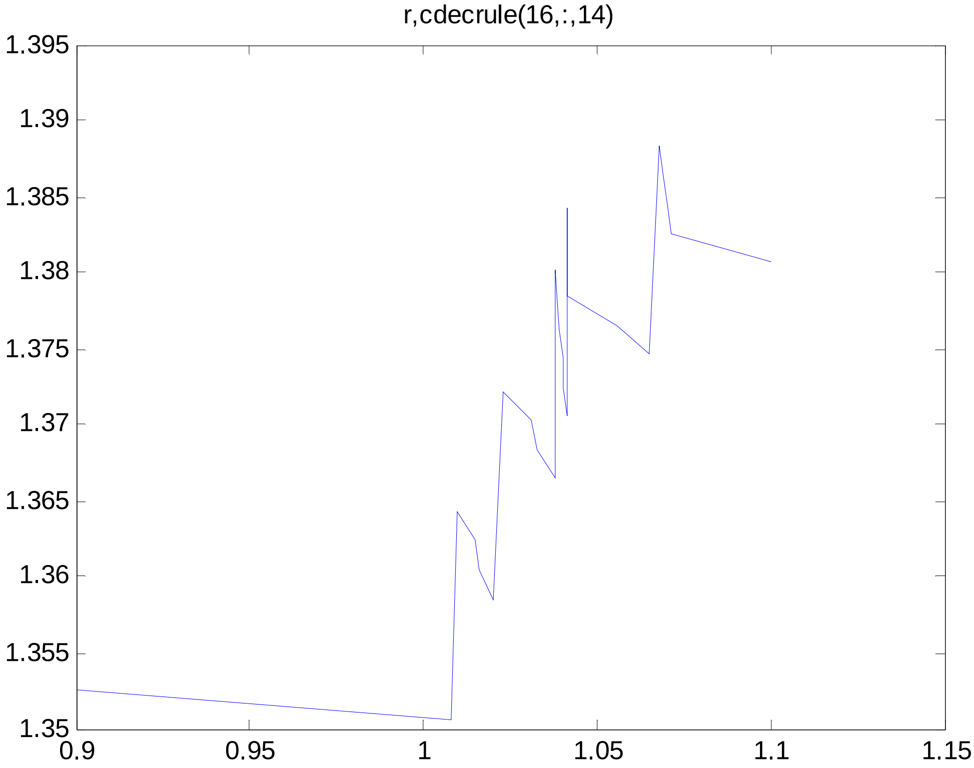

r,cdecrule(12,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

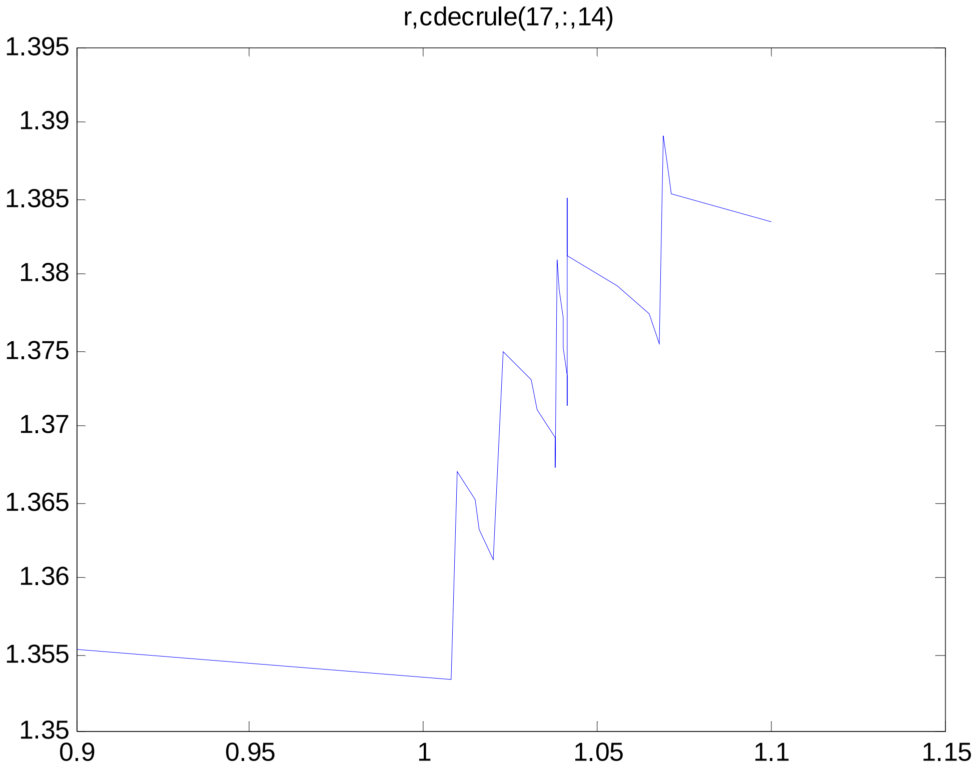

r,cdecrule(13,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

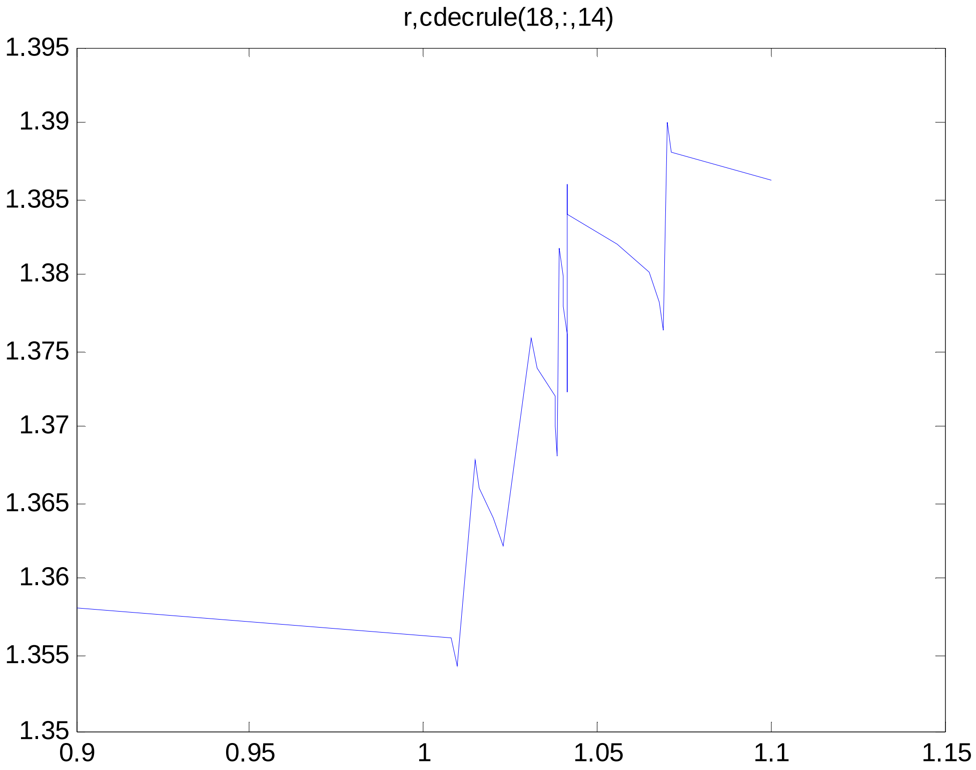

r,cdecrule(14,:,14)
1.4
1.39
1.38
1.37
1.36
1.35
1.34
0.9
0.95
1
1.05
1.1
1.15

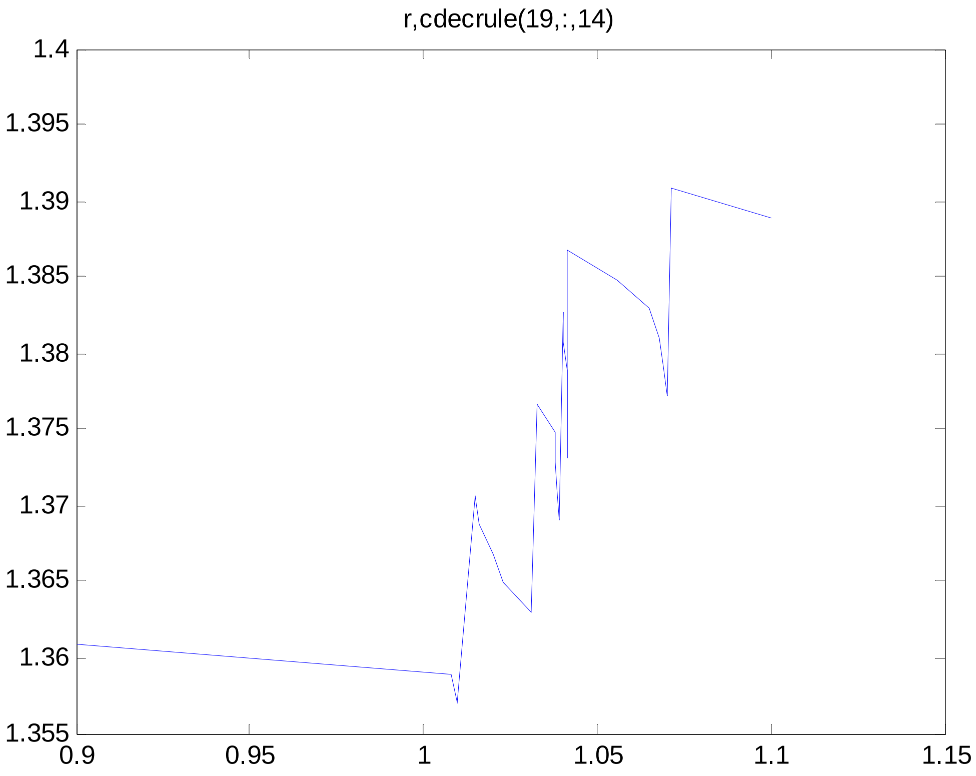

r,cdecrule(15,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

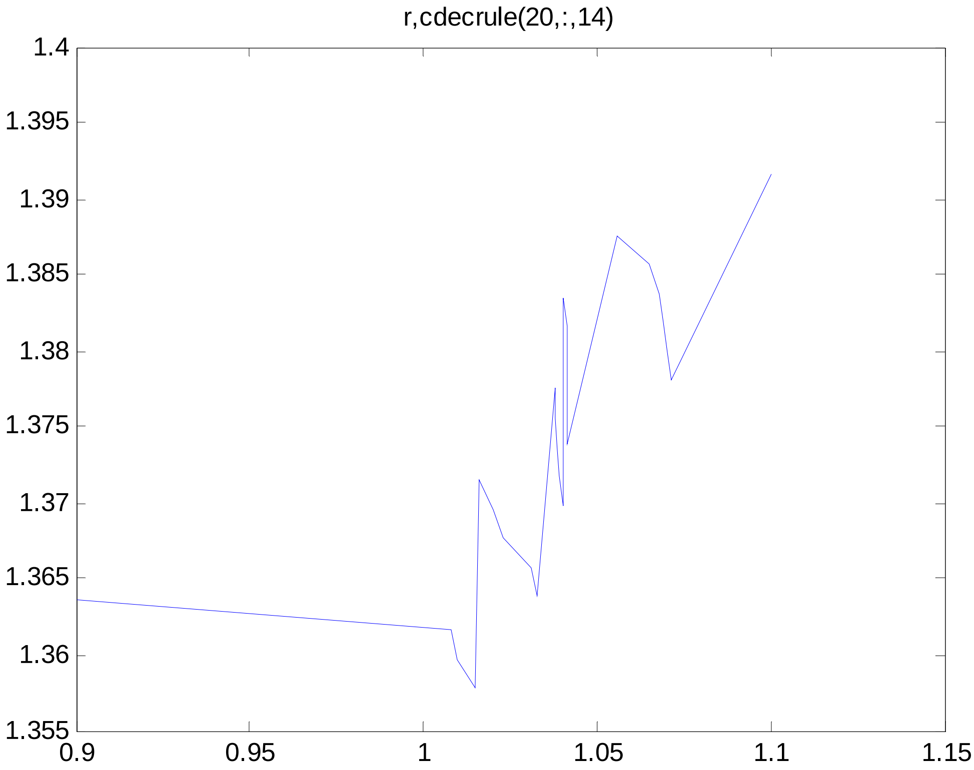

r,cdecrule(15,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
1.345
0.9
0.95
1
1.05
1.1
1.15

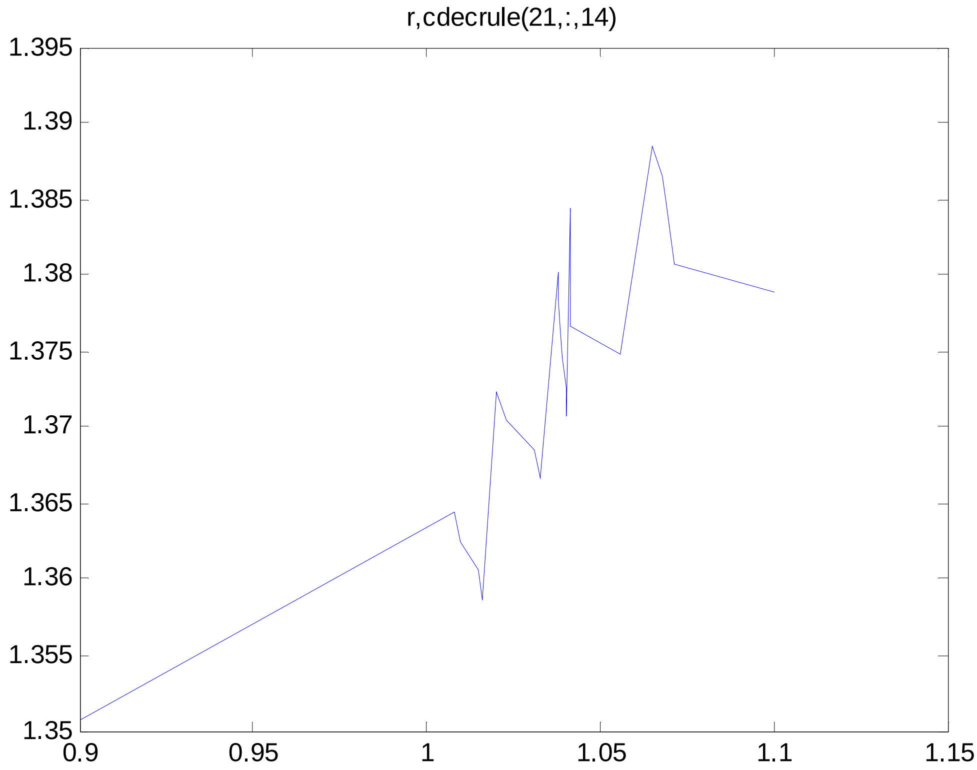

r,cdecrule(16,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

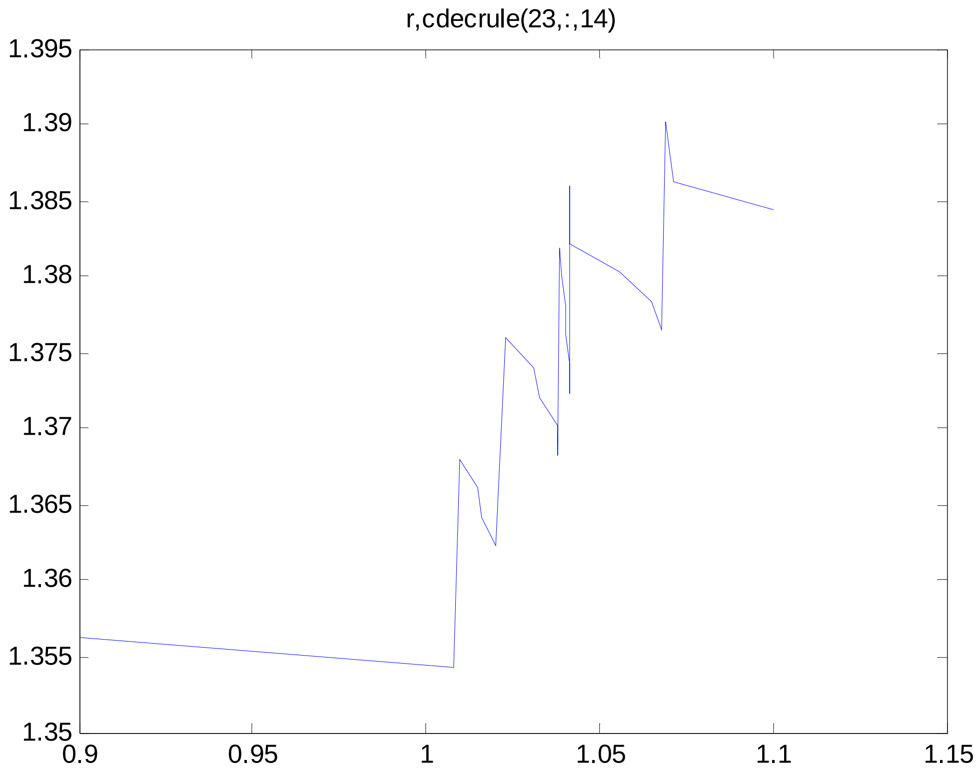

r,cdecrule(17,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

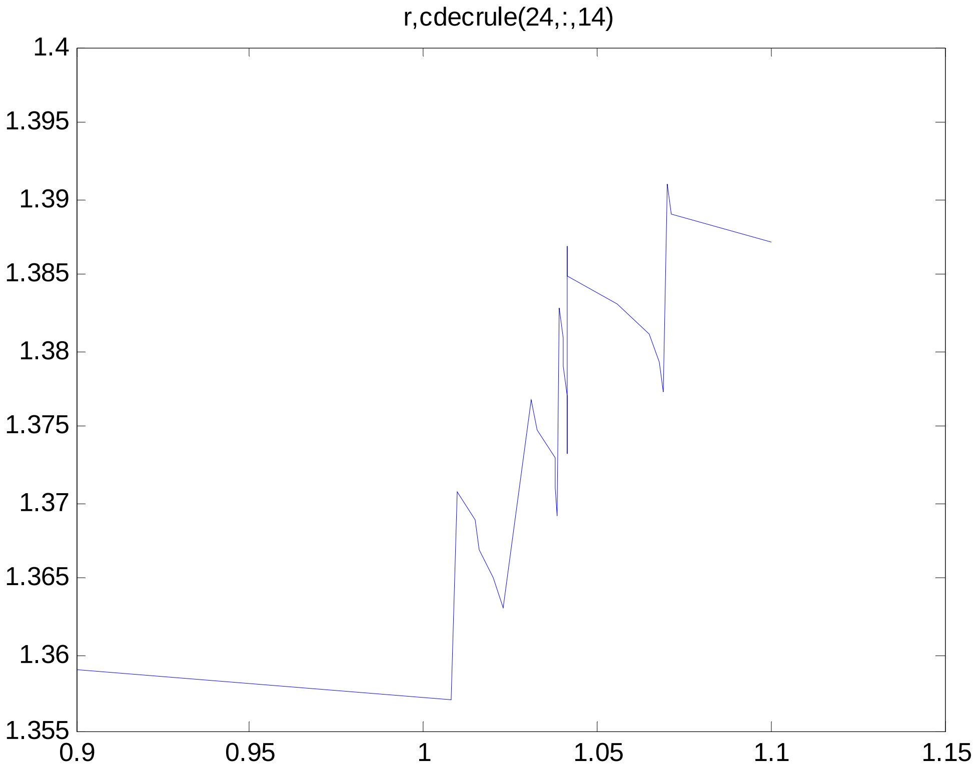

r,cdecrule(18,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

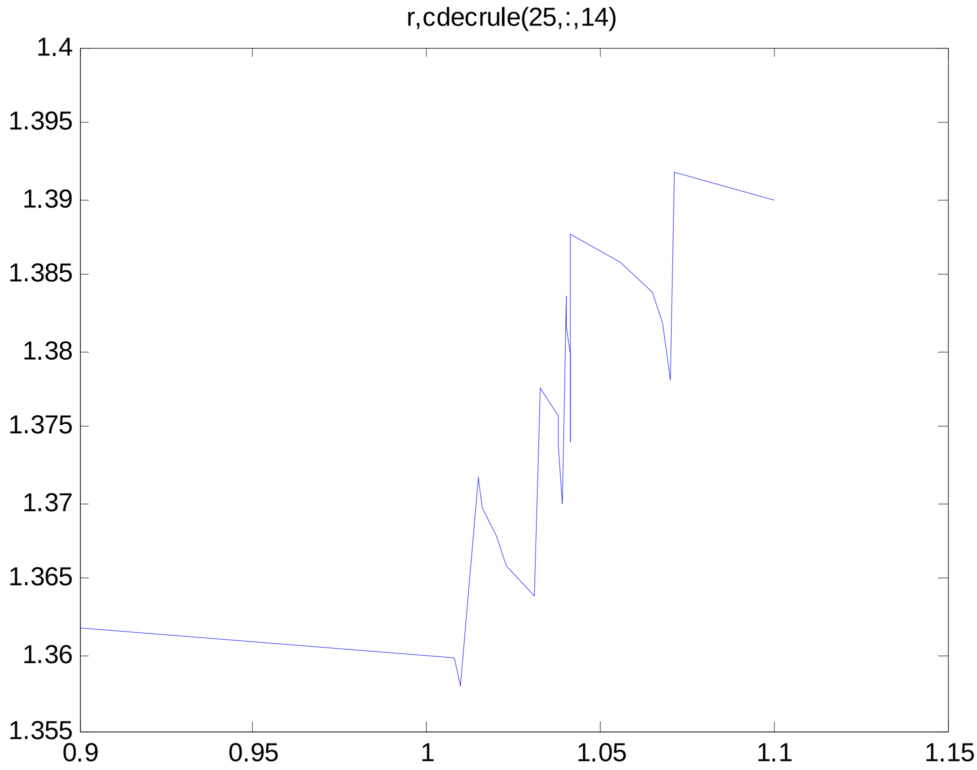

r,cdecrule(19,:,14)
1.4
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15

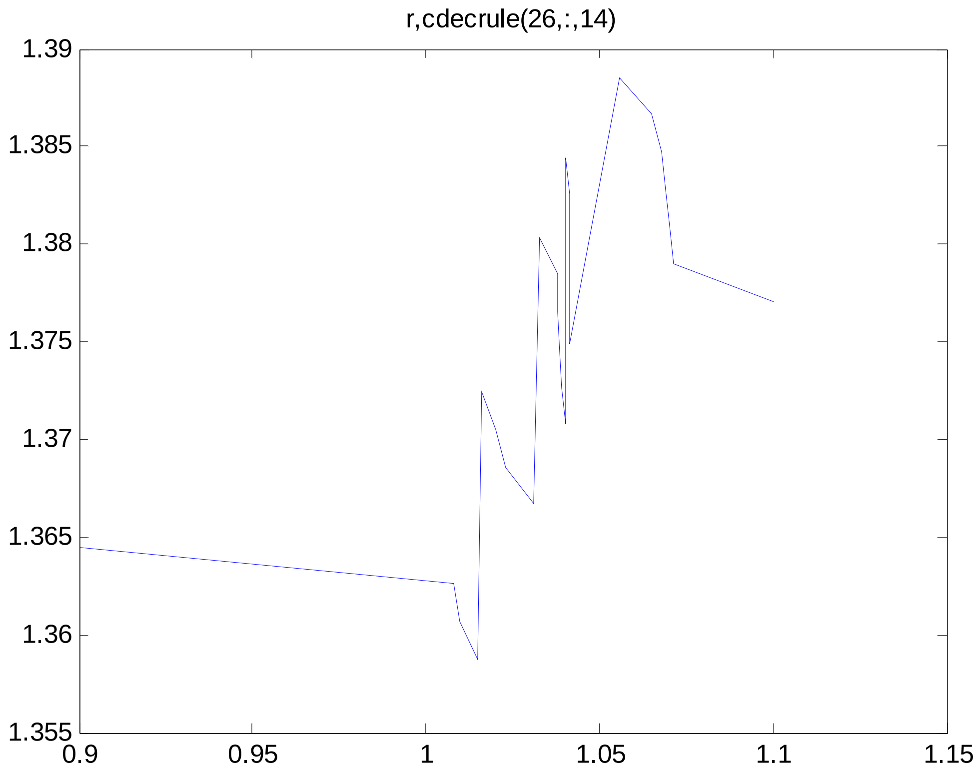

r,cdecrule(20,:,14)
1.4
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15

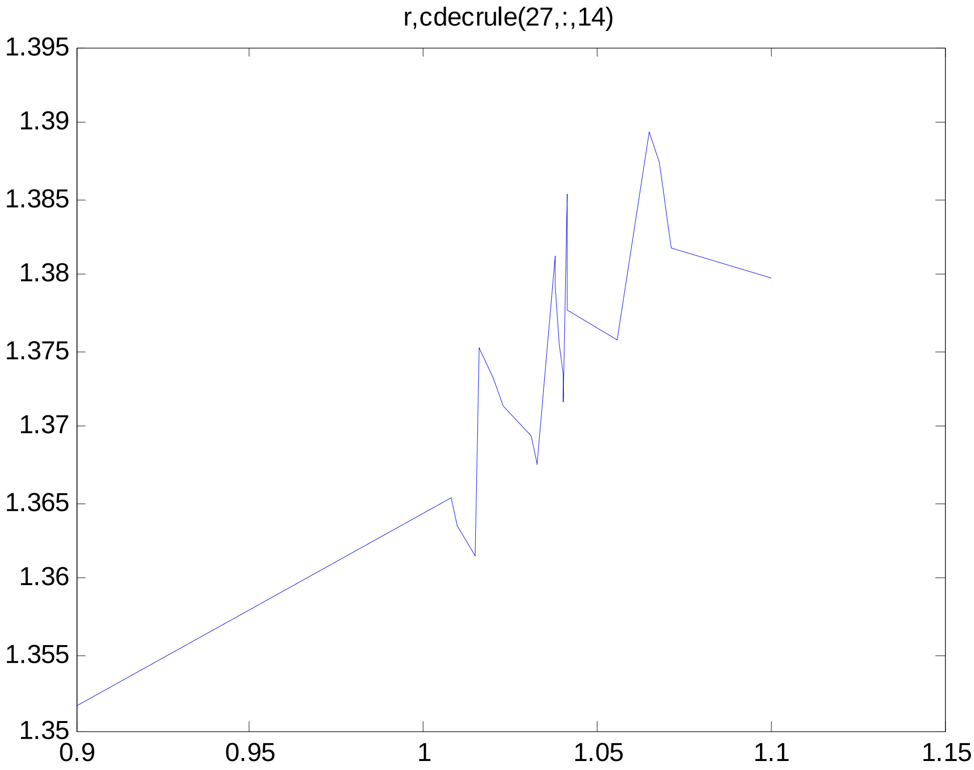

r,cdecrule(21,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(23,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

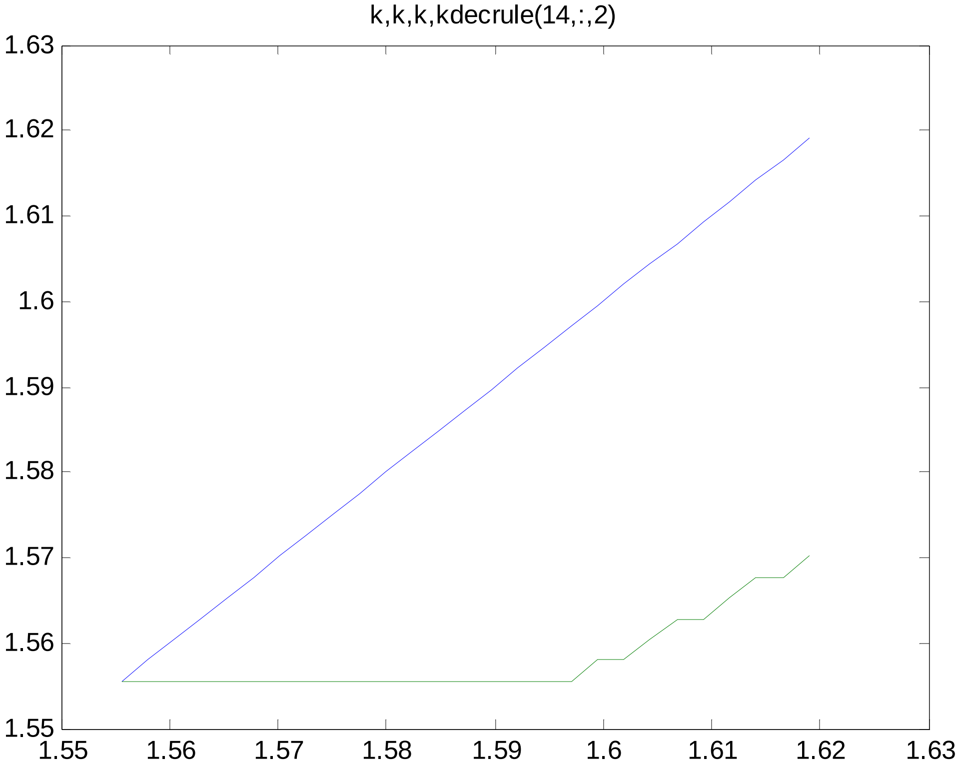

r,cdecrule(24,:,14)
1.4
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15

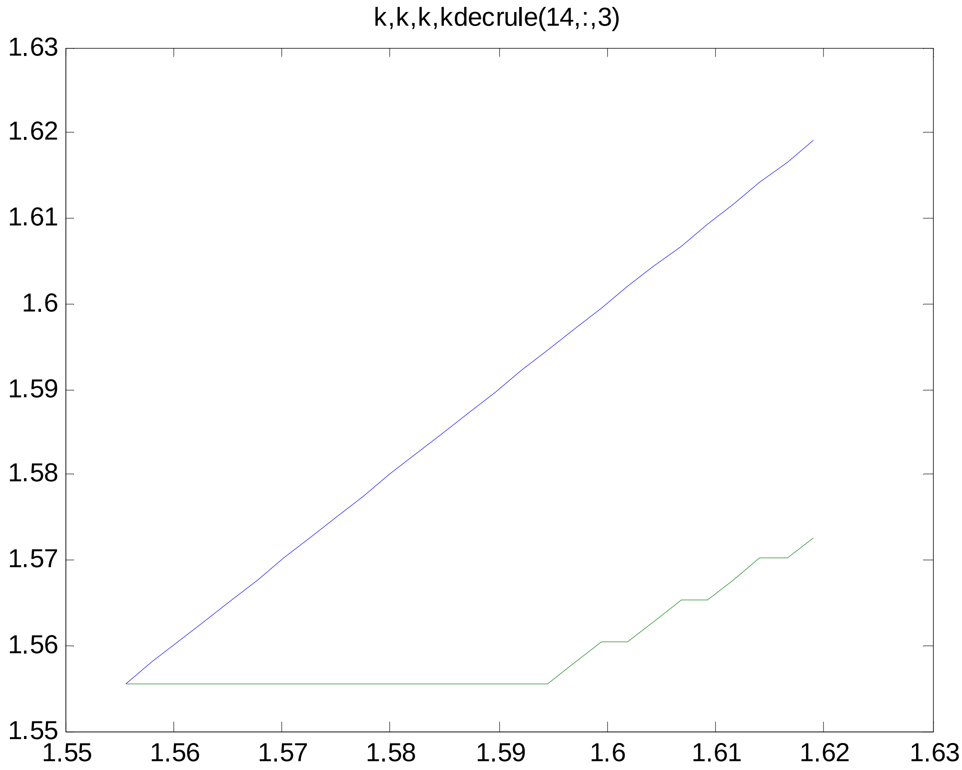

r,cdecrule(25,:,14)
1.4
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15

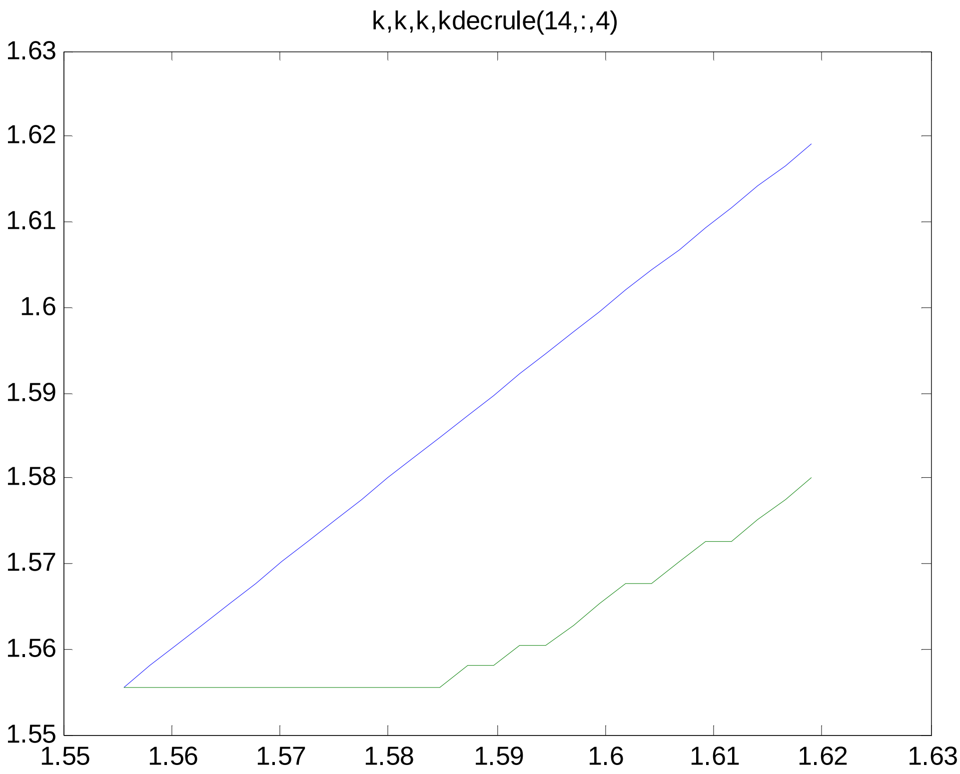

r,cdecrule(26,:,14)
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
0.9
0.95
1
1.05
1.1
1.15


r,cdecrule(27,:,14)
1.395
1.39
1.385
1.38
1.375
1.37
1.365
1.36
1.355
1.35
0.9
0.95
1
1.05
1.1
1.15

Case_9


k,k,k,kdecrule(14,:,2)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,k,k,kdecrule(14,:,3)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,k,k,kdecrule(14,:,4)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
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1.58
1.59
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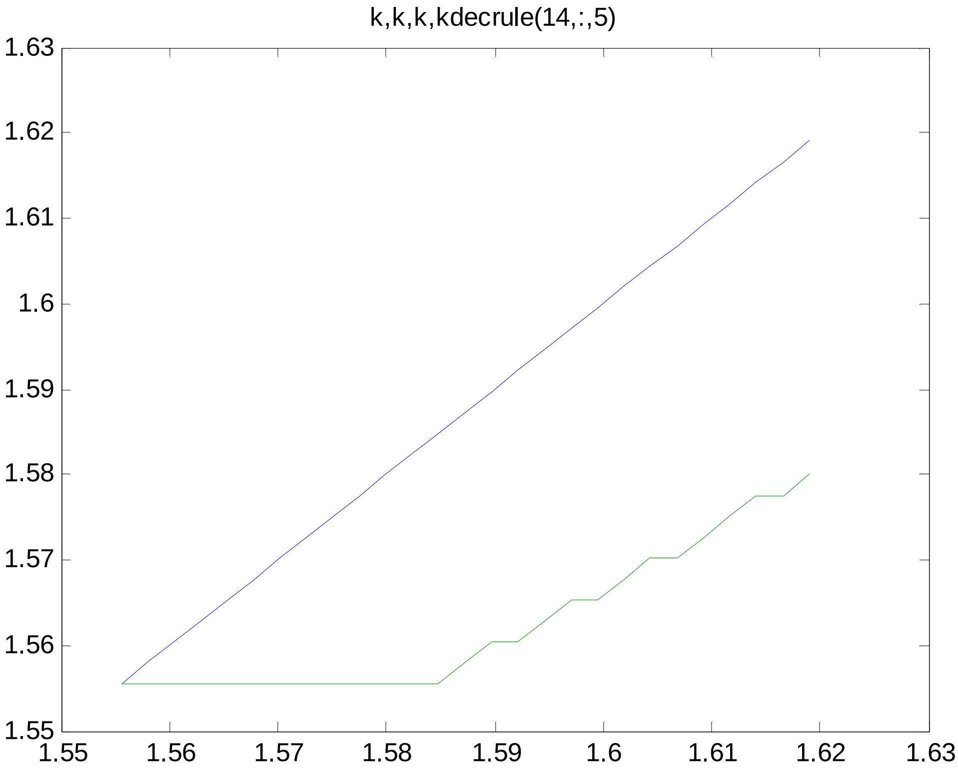
1.61
1.62
1.63


k,k,k,kdecrule(14,:,5)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
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1.55
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1.58
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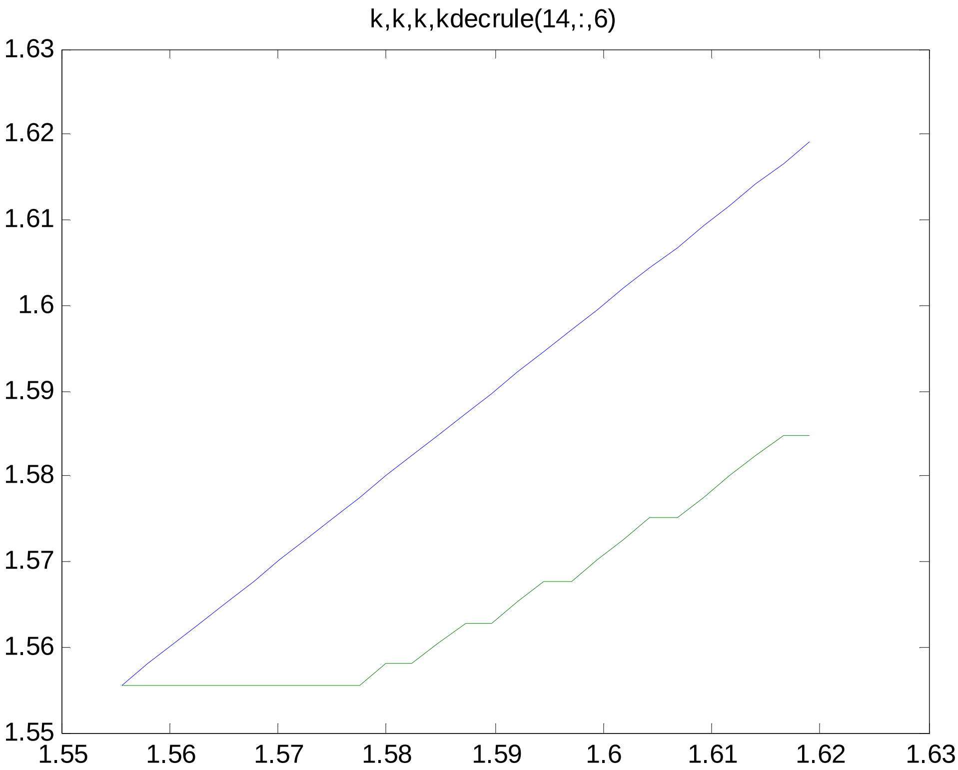
1.61
1.62
1.63


k,k,k,kdecrule(14,:,6)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
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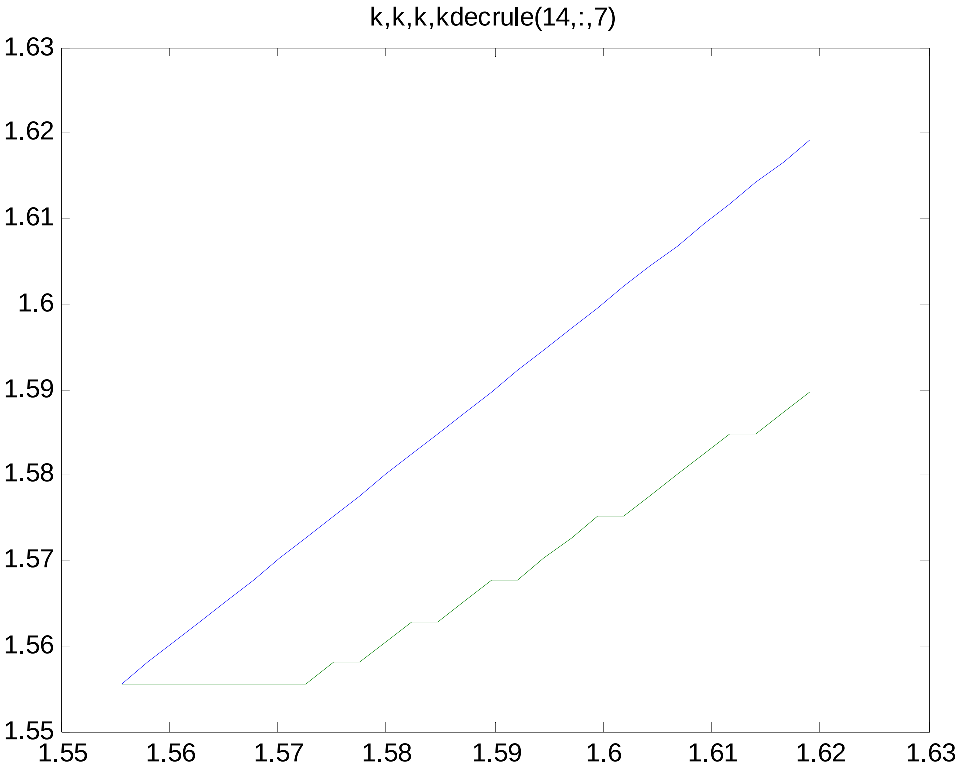
1.61
1.62
1.63


k,k,k,kdecrule(14,:,7)
1.63
1.62
1.61
1.6
1.59
1.58
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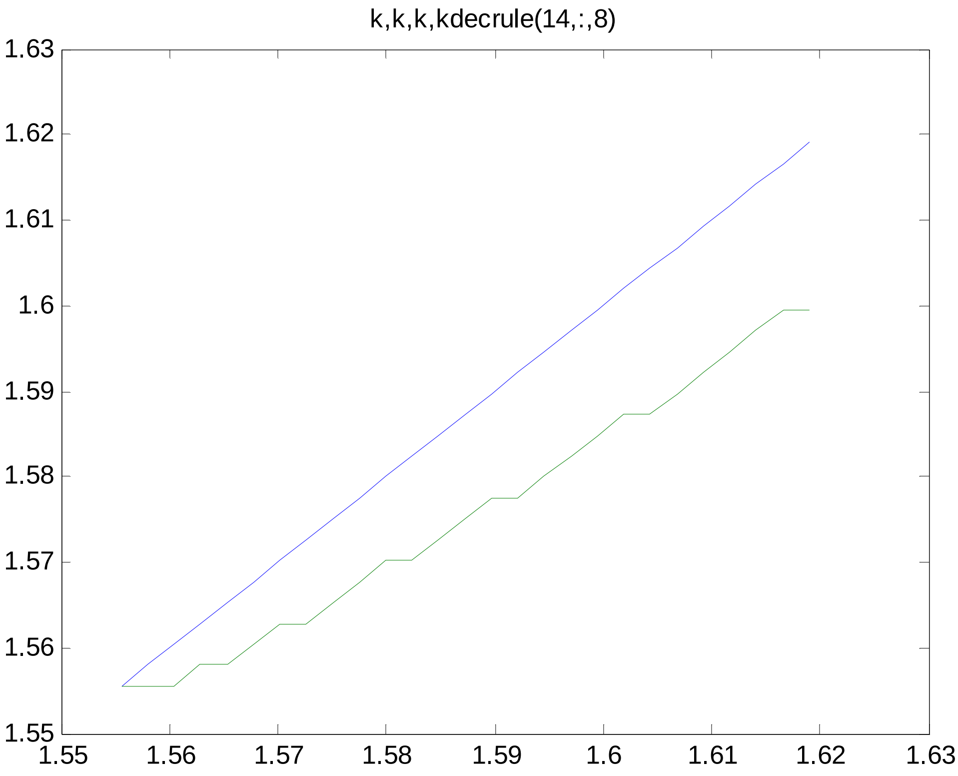
1.61
1.62
1.63


k,k,k,kdecrule(14,:,8)
1.63
1.62
1.61
1.6
1.59
1.58
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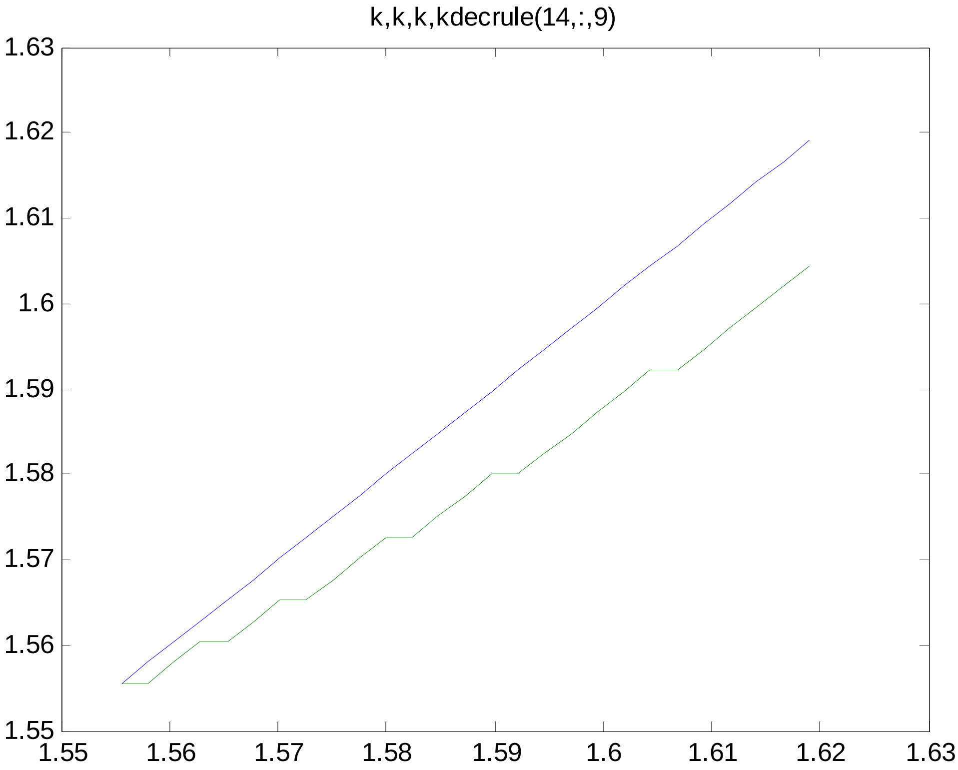
1.56
1.55
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,k,k,kdecrule(14,:,9)
1.63
1.62
1.61
1.6
1.59
1.58
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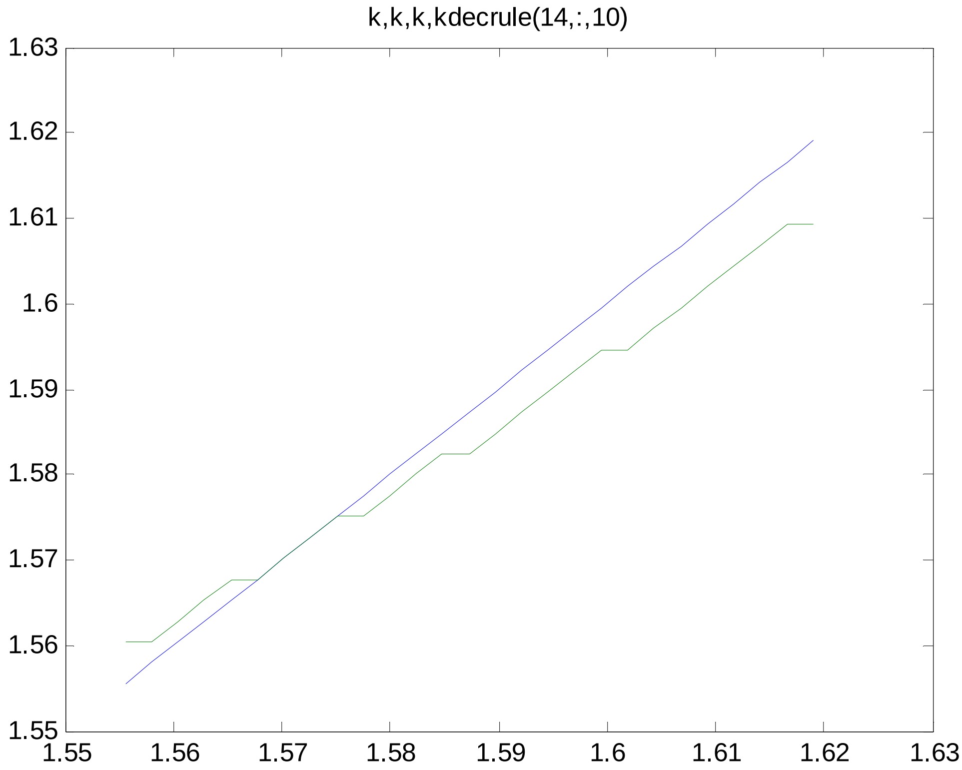
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63


k,k,k,kdecrule(14,:,10)
1.63
1.62
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1.6
1.59
1.58
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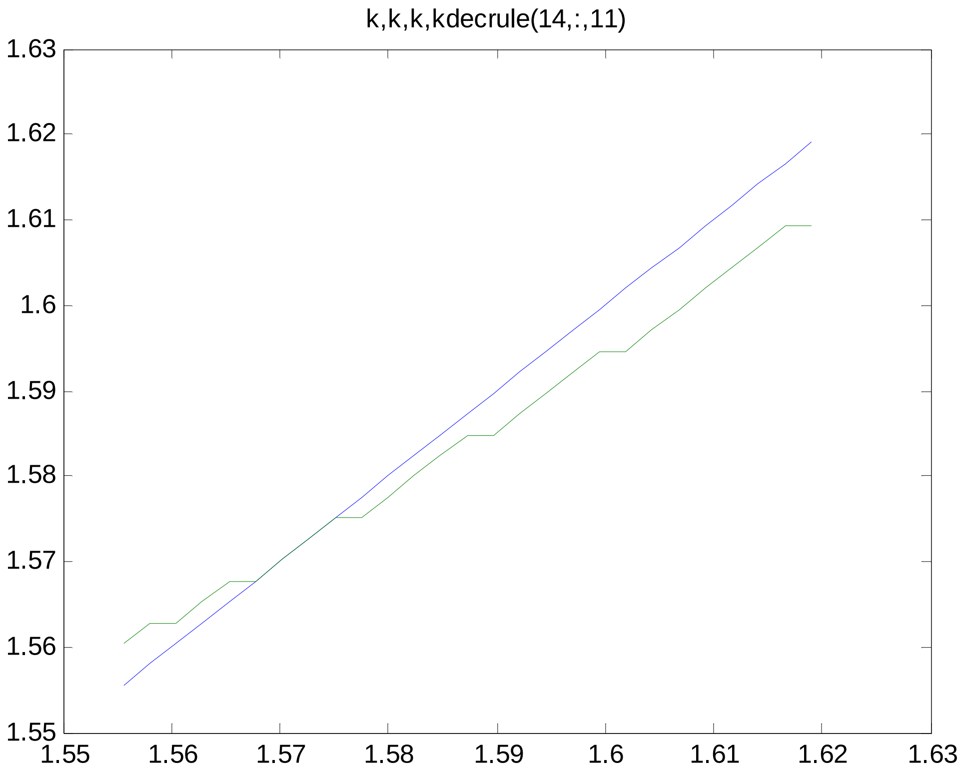
1.61
1.62
1.63


k,k,k,kdecrule(14,:,11)
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1.62
1.61
1.6
1.59
1.58
1.57
1.56
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1.55
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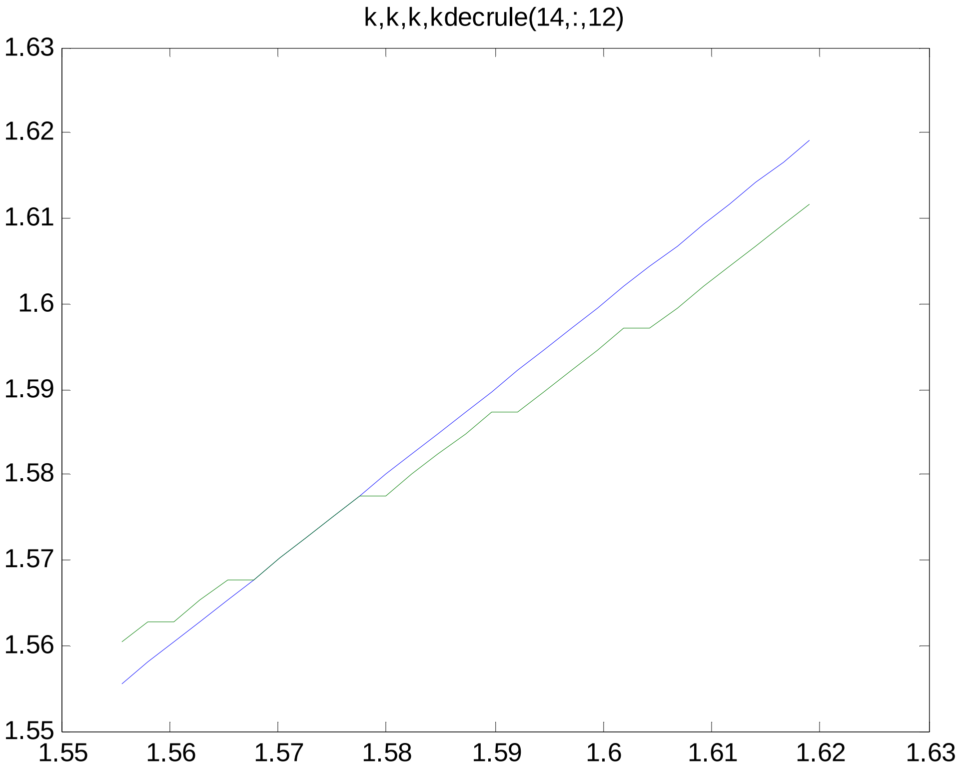
1.61
1.62
1.63


k,k,k,kdecrule(14,:,12)
1.63
1.62
1.61
1.6
1.59
1.58
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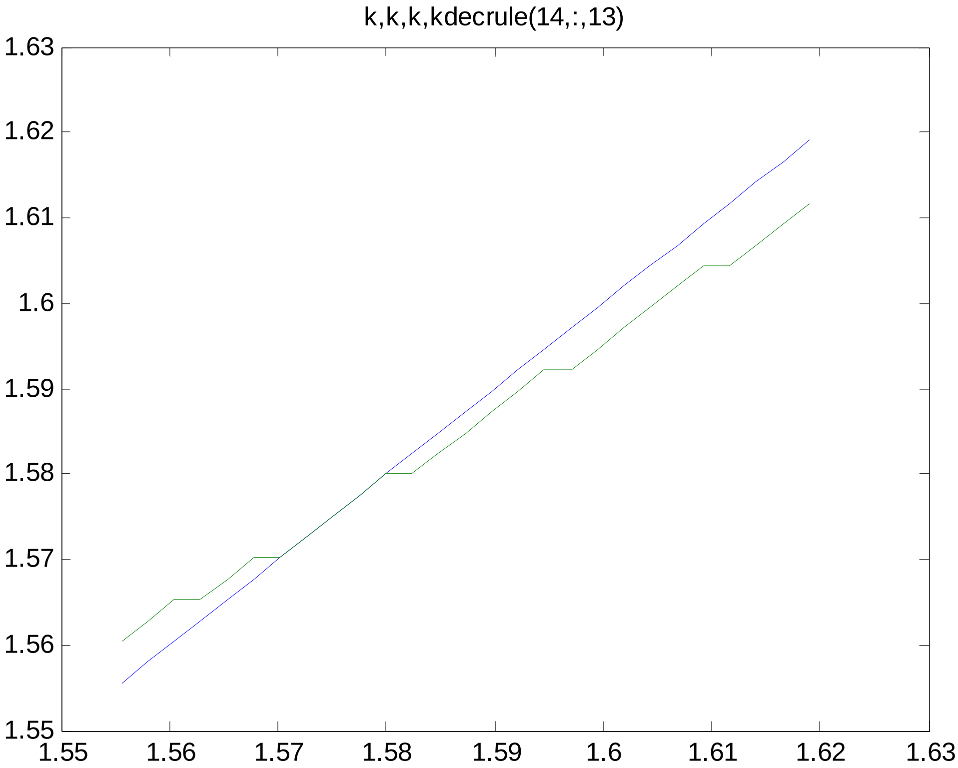
1.61
1.62
1.63


k,k,k,kdecrule(14,:,13)
1.63
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1.61
1.6
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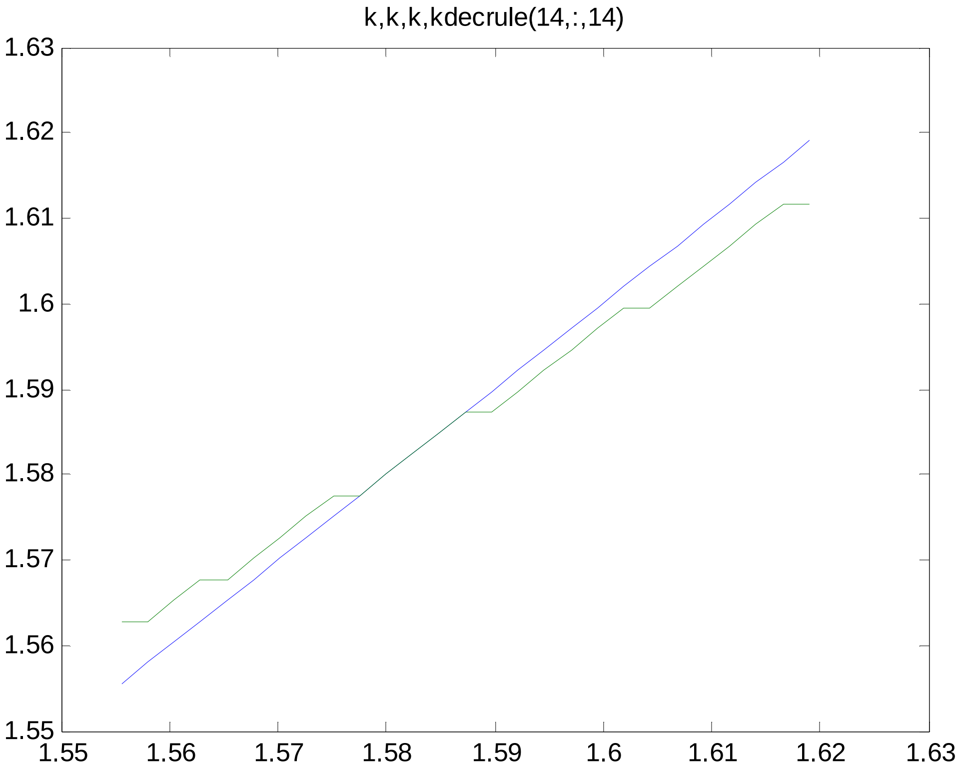
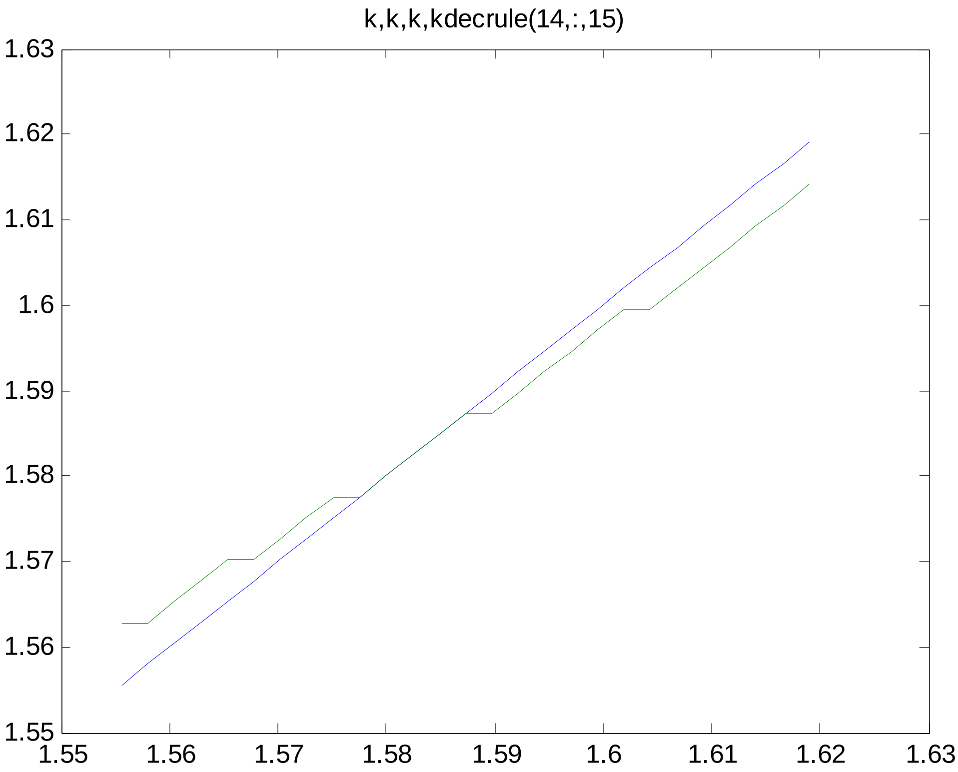
1.61
1.62
1.63


k,k,k,kdecrule(14,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
1.55 1.56 1.57 1.58 1.59 1.6 1.61 1.62 1.63


k,k,k,kdecrule(14,:,15)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
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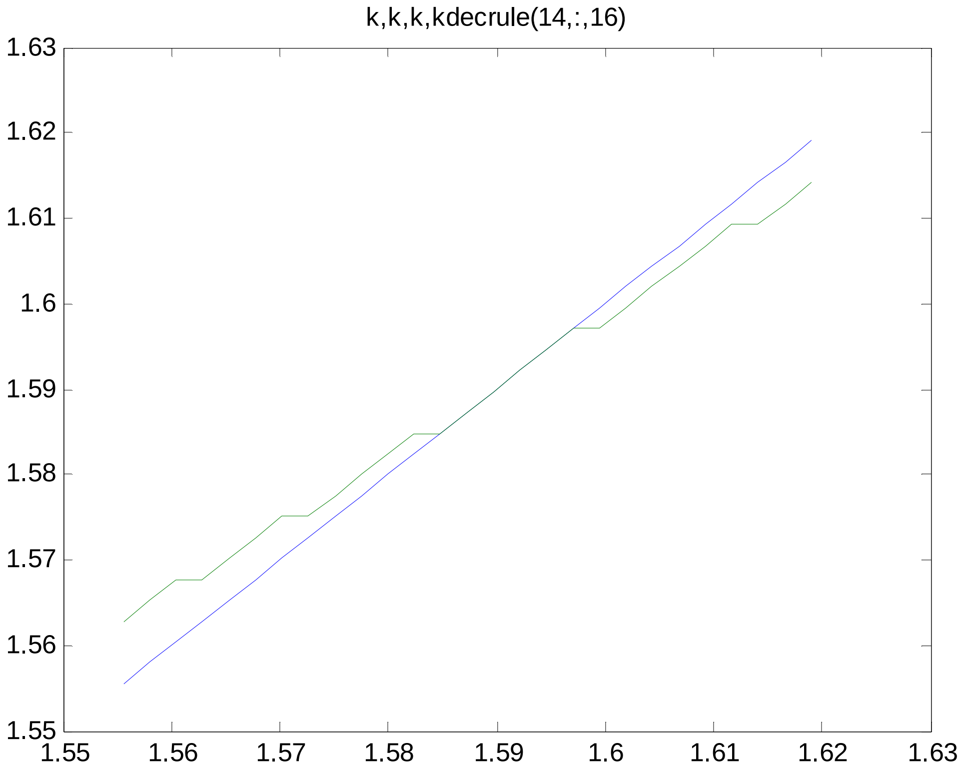
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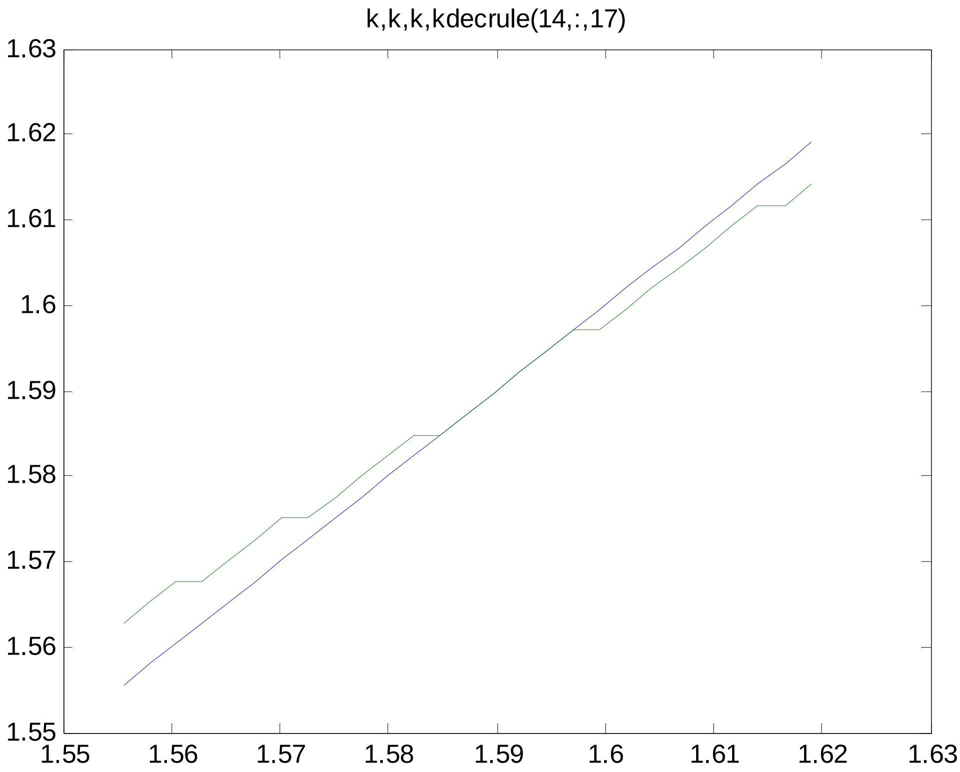
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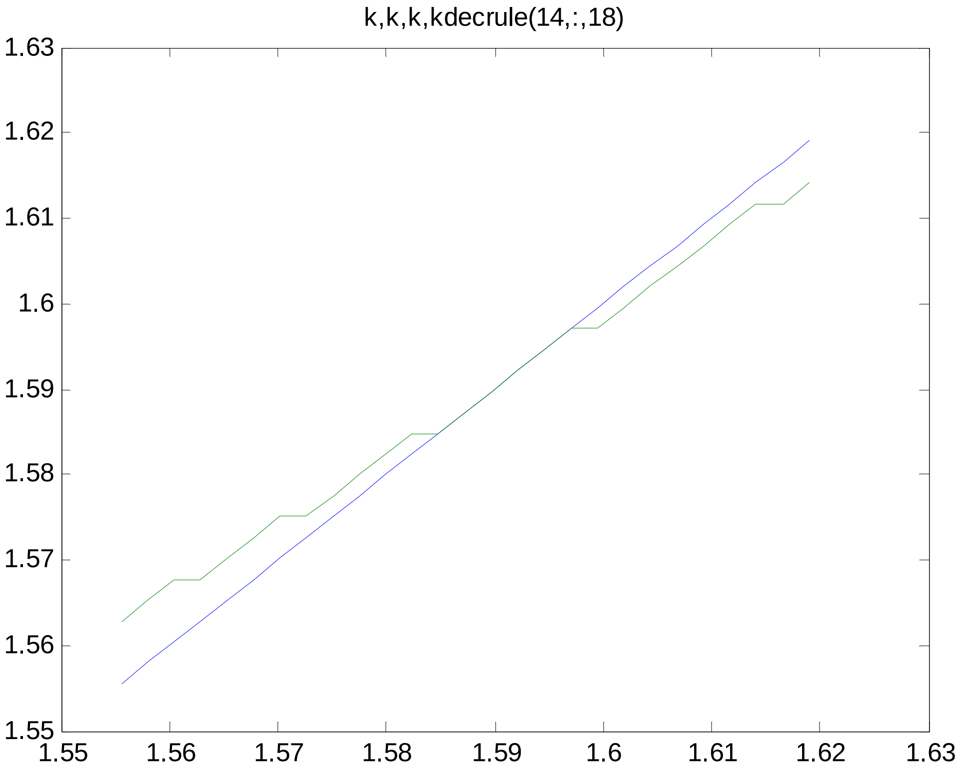
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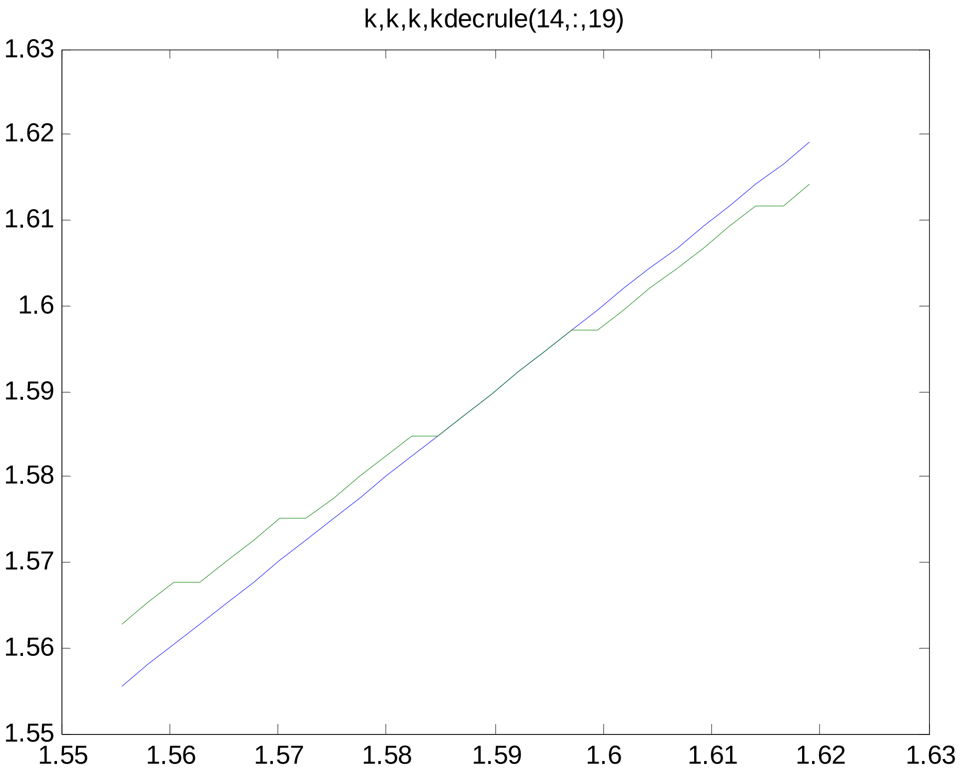
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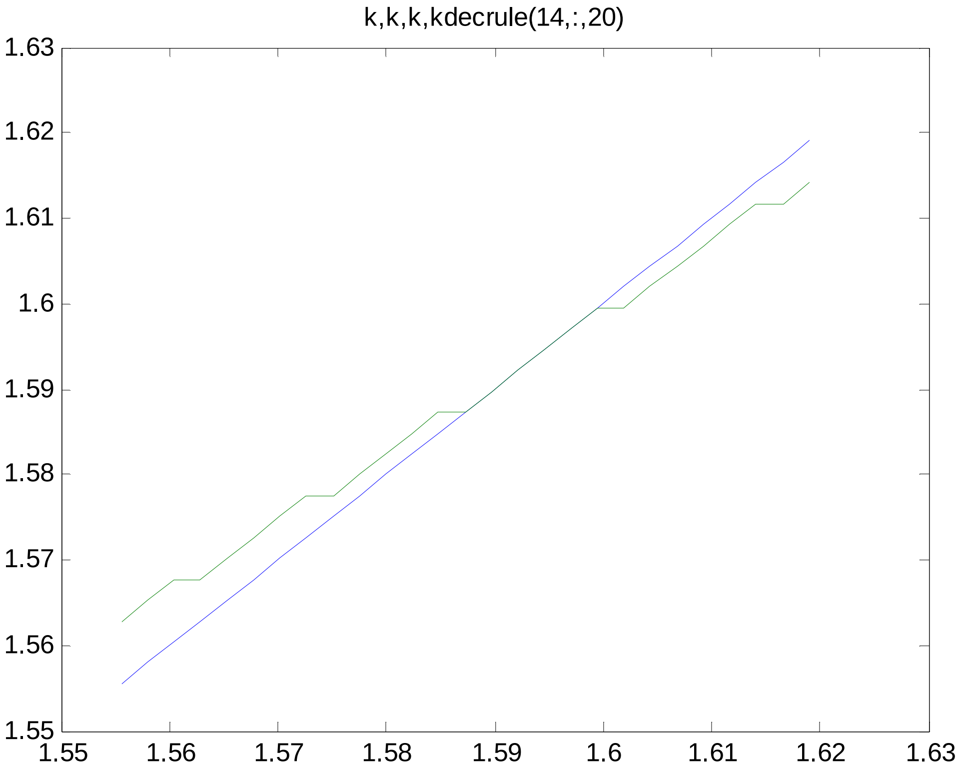
1.63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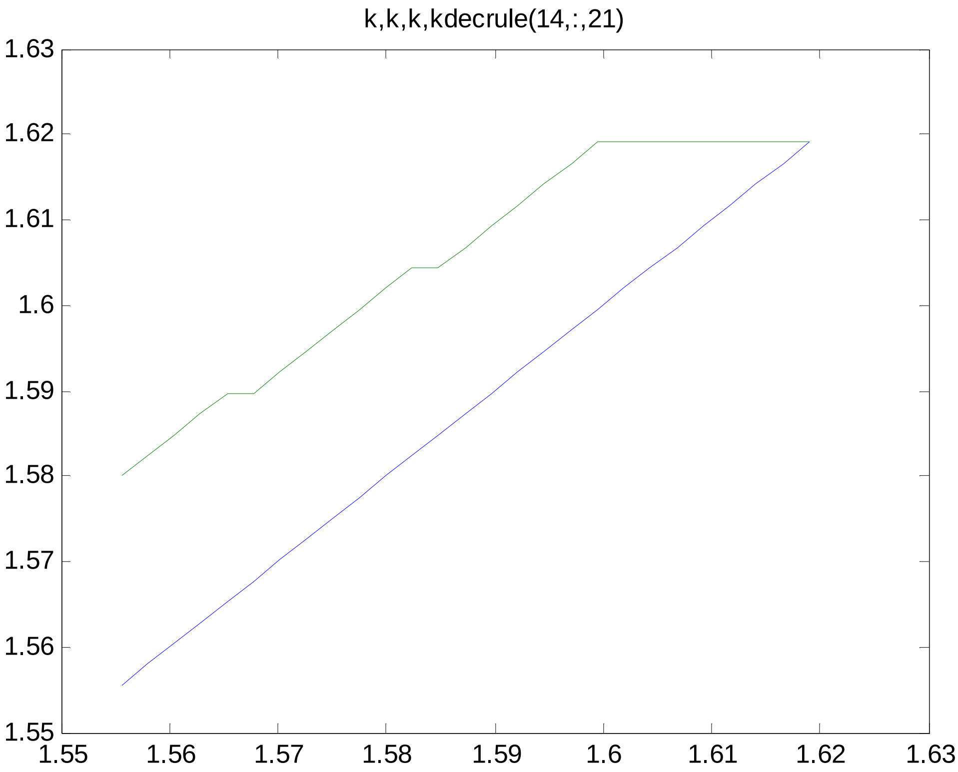
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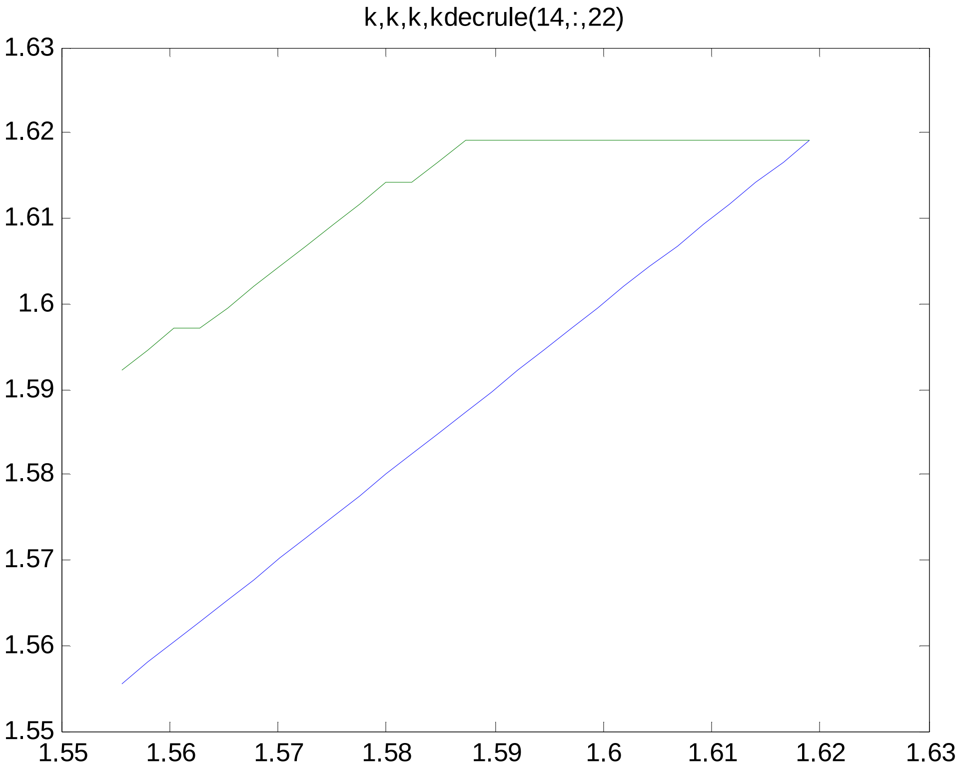
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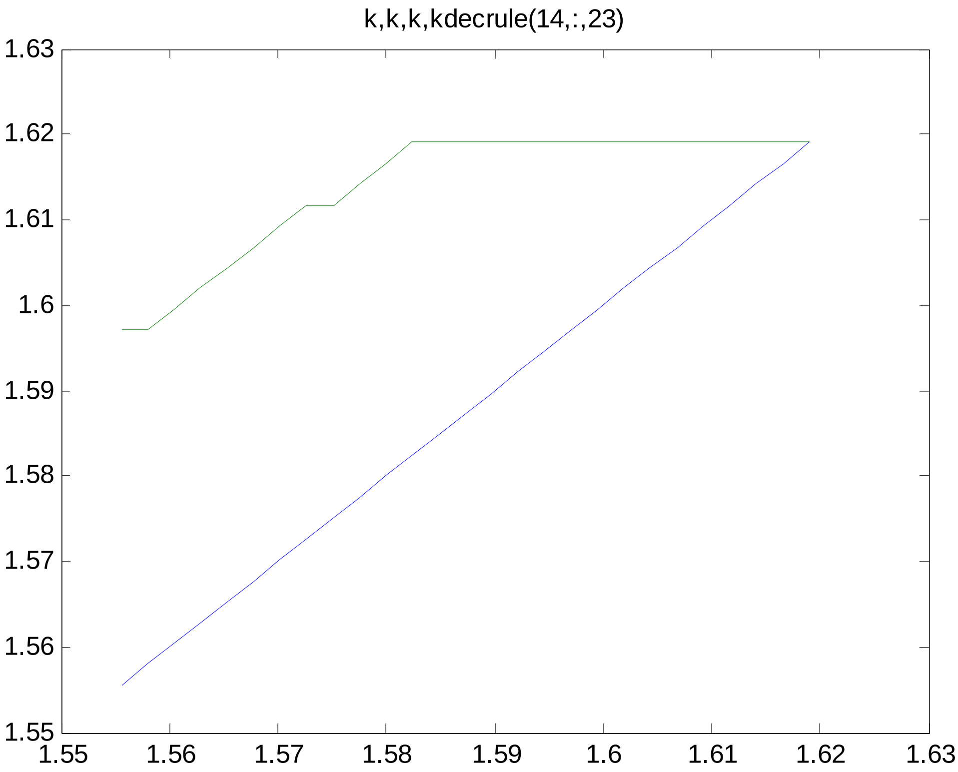
1.63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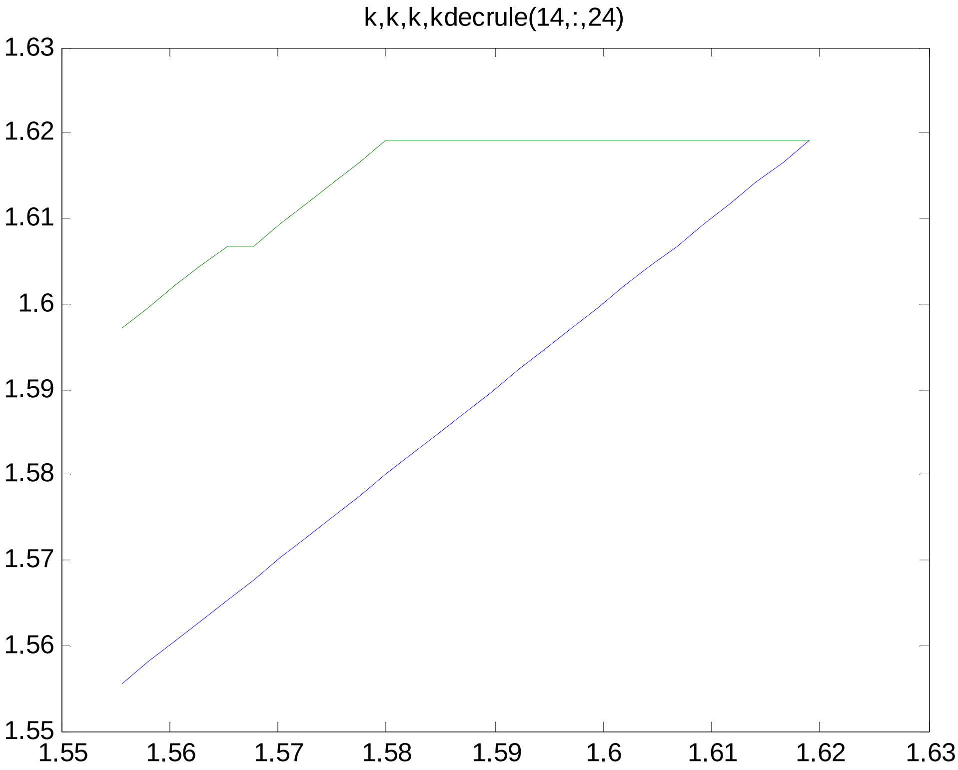
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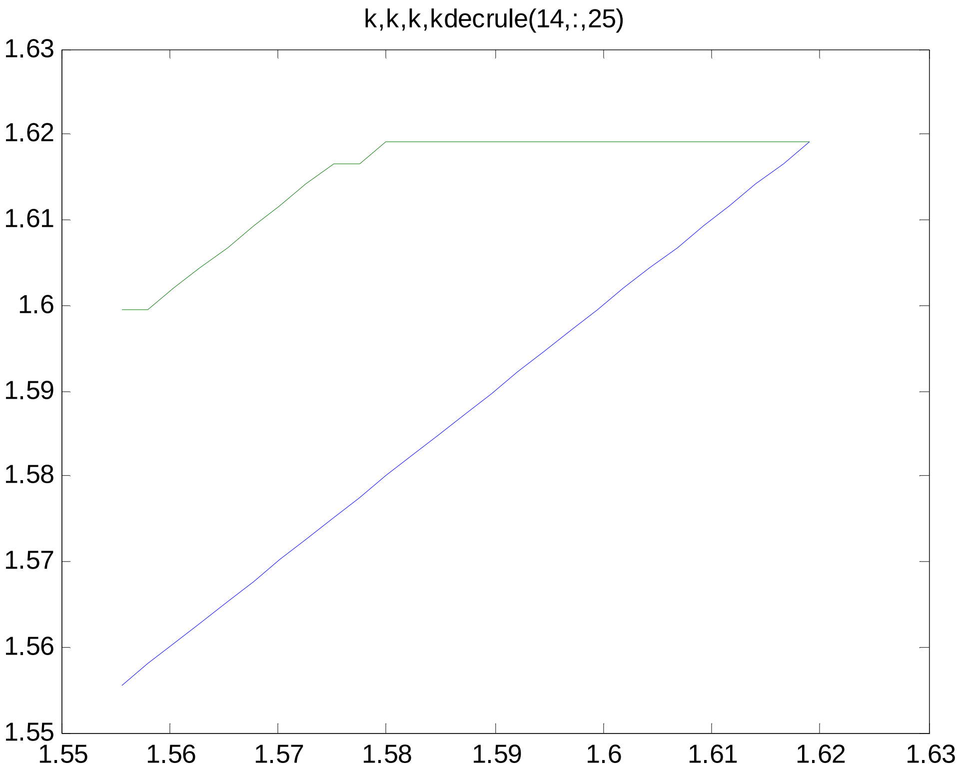
k,k,k,kdecrule(14,:,25)
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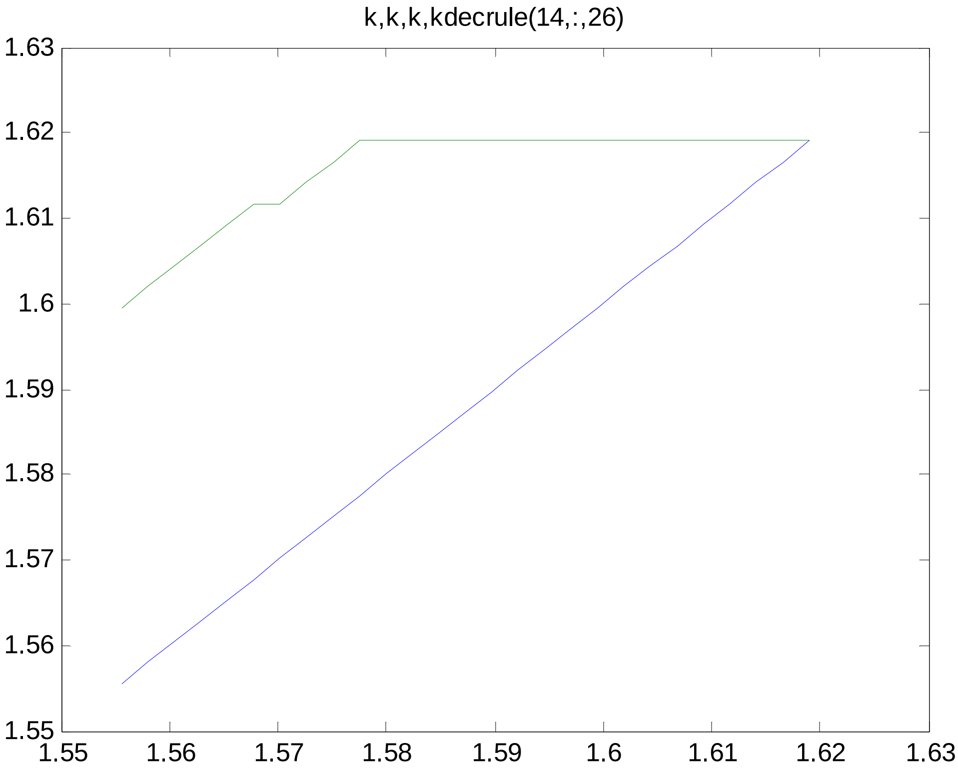
1.61
1.62
1.63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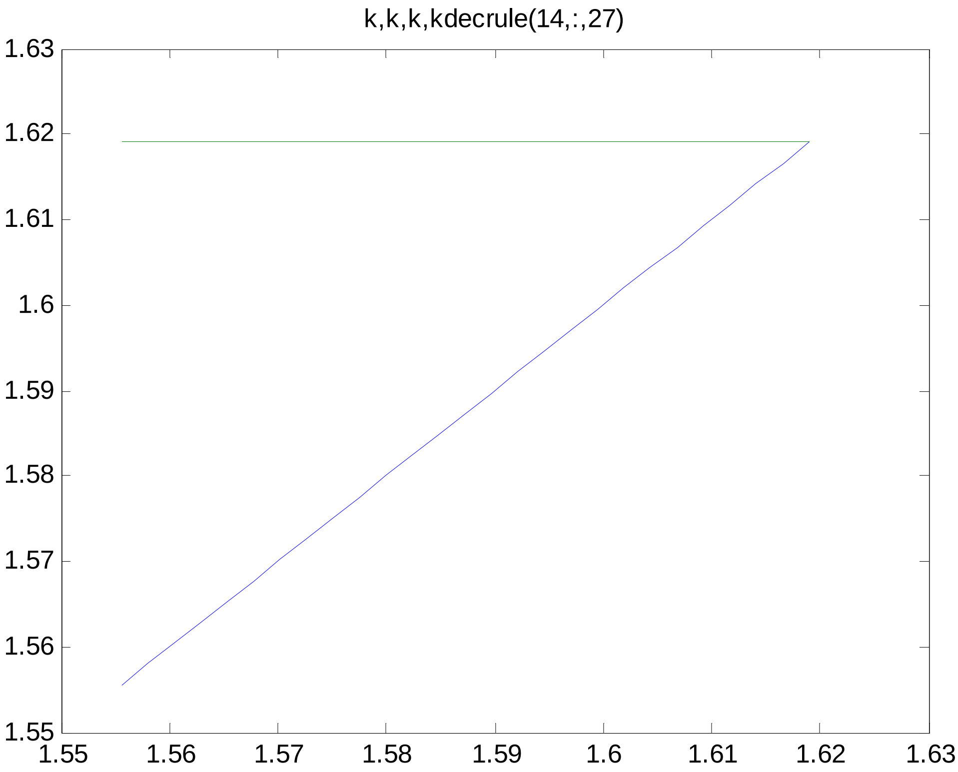
1.6
1.61
1.62
1.63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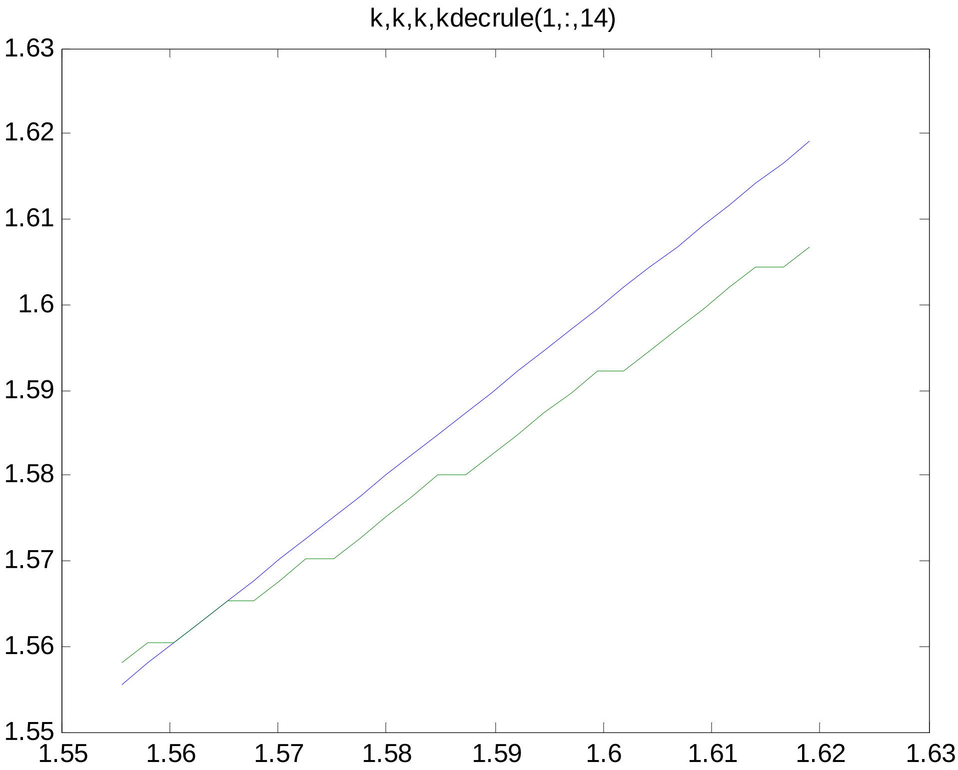
1.61
1.62
1.63

Case_10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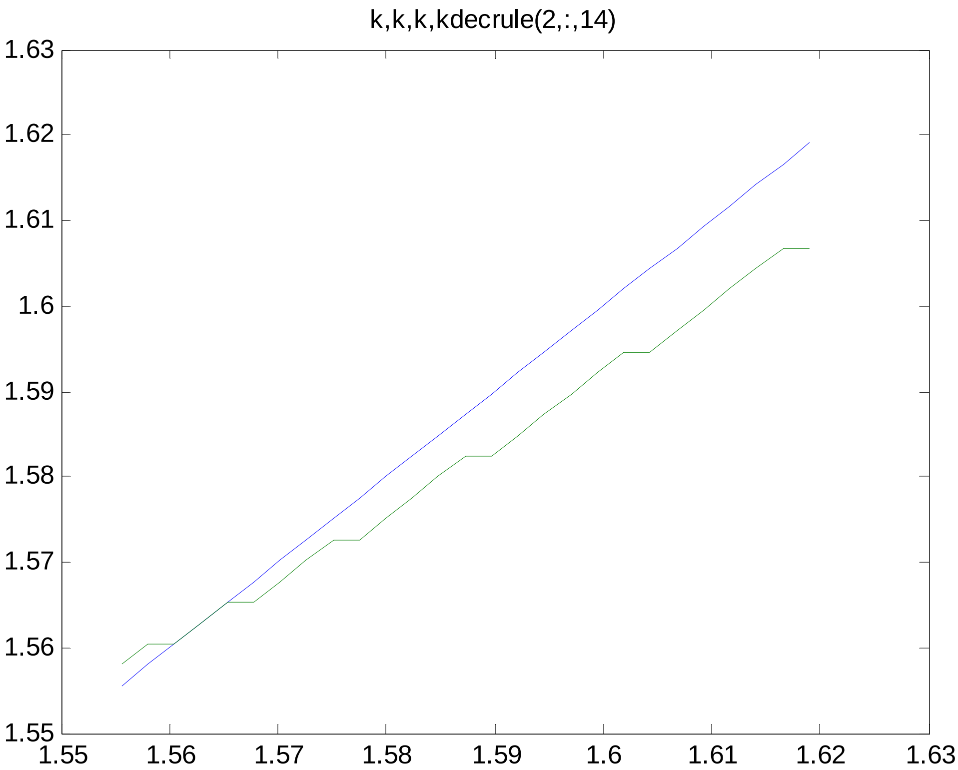
1.62
1.63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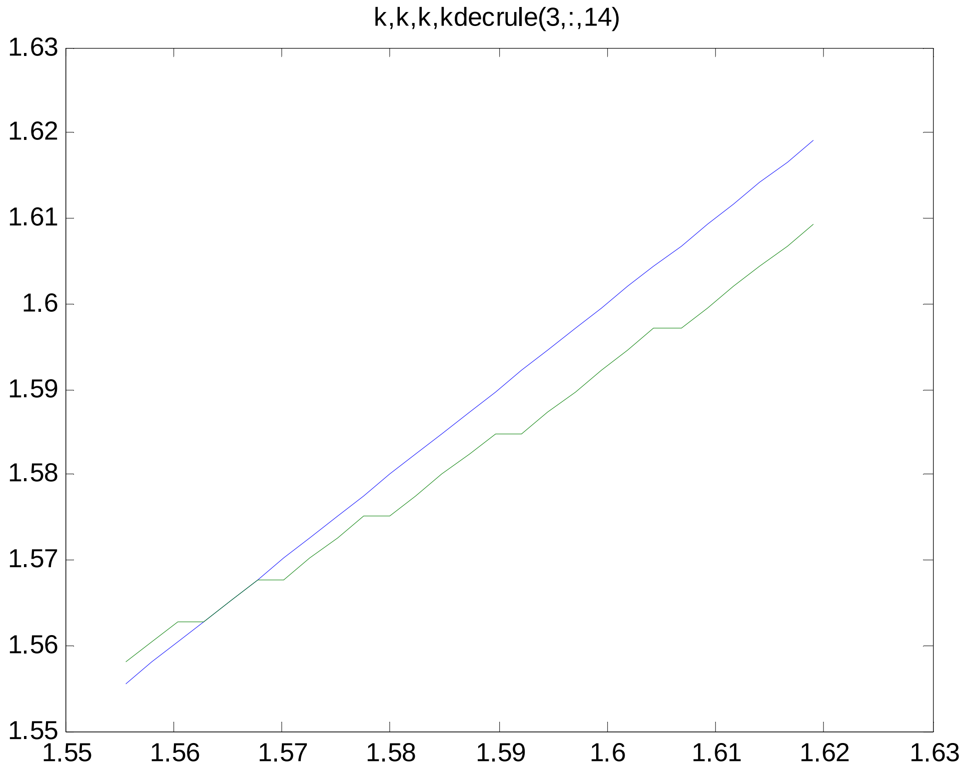
k,k,k,kdecrule(3,:,14)
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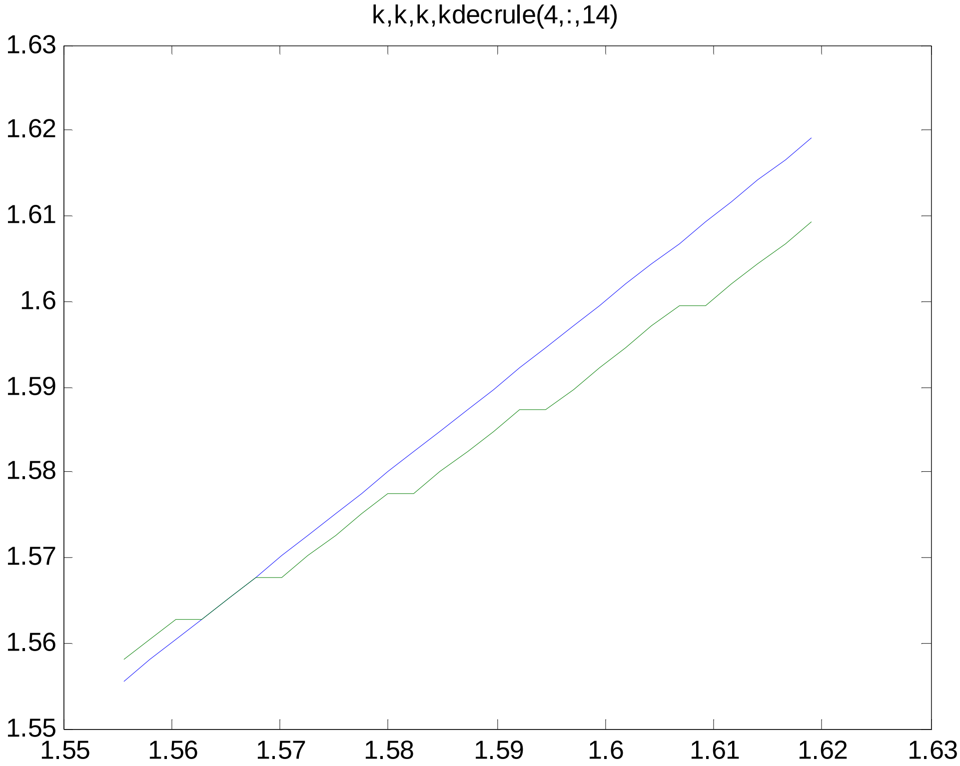
1.55 1.56 1.57 1.58 1.59 1.6 1.61 1.62 1.63


k,k,k,kdecrule(4,:,14)
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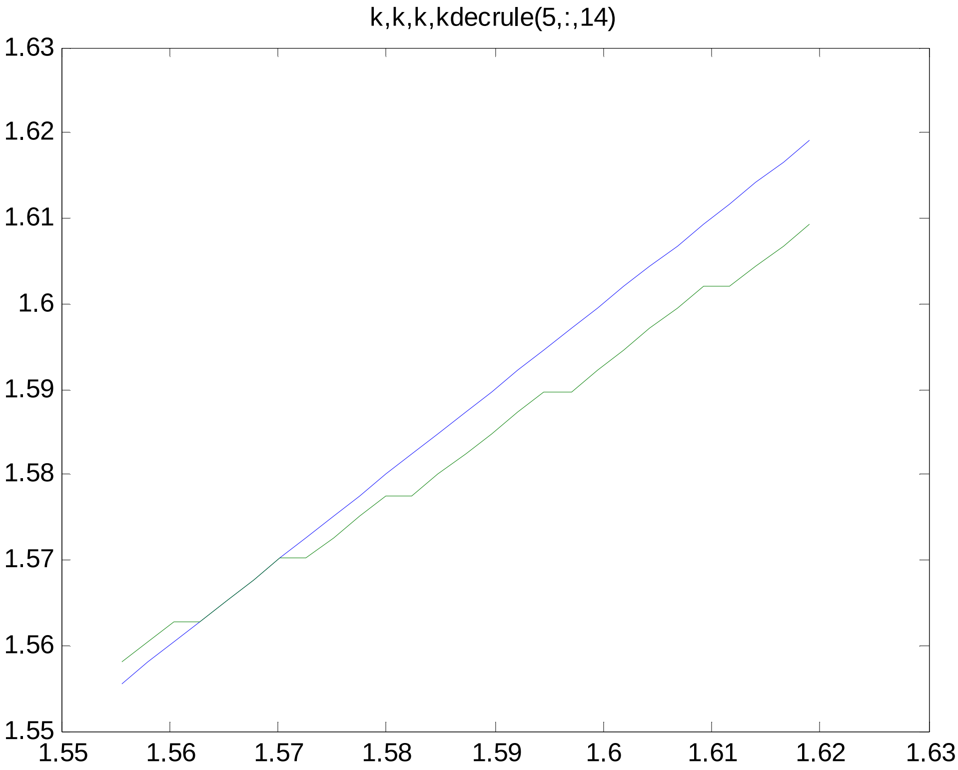
k,k,k,kdecrule(5,:,14)
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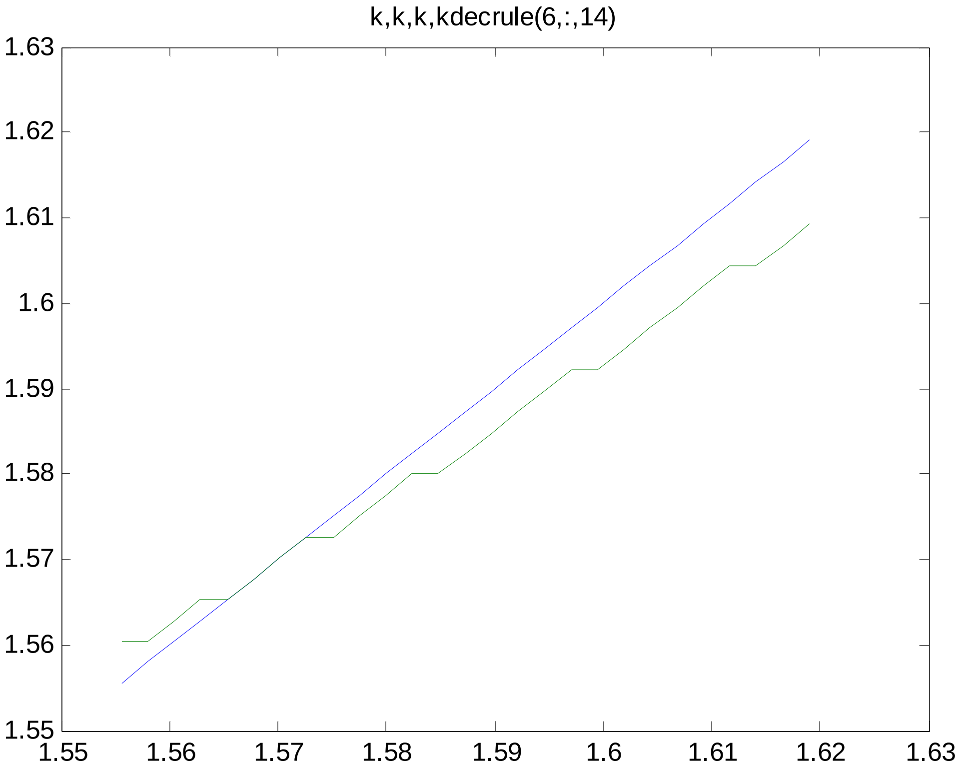
1.62
1.63


k,k,k,kdecrule(6,:,14)
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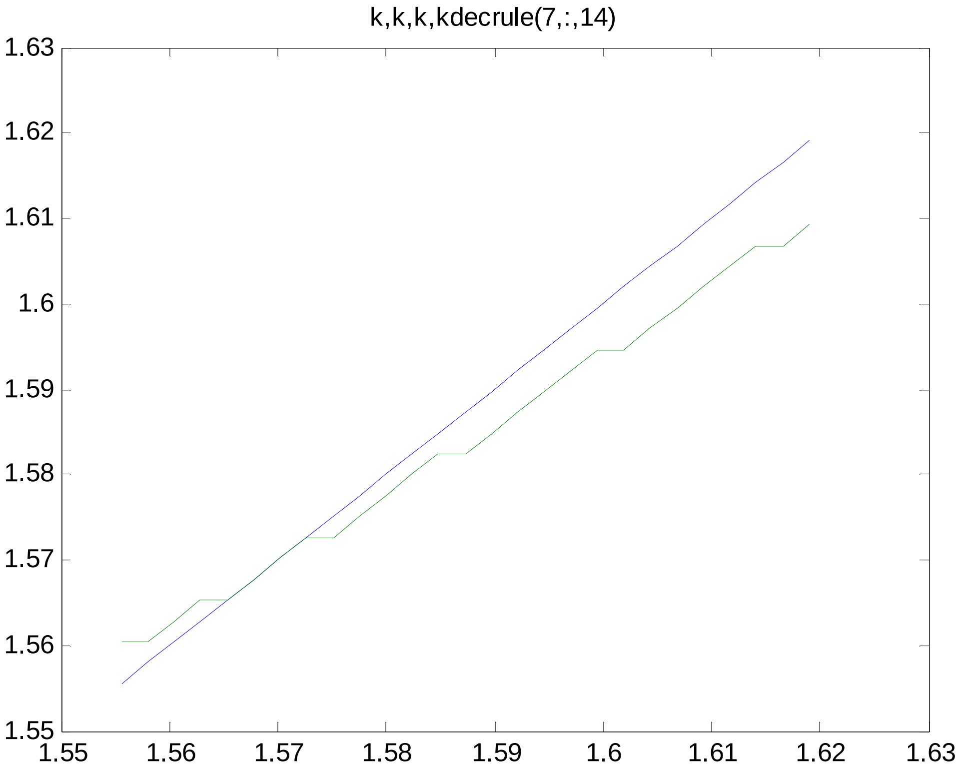
1.63


k,k,k,kdecrule(7,:,14)
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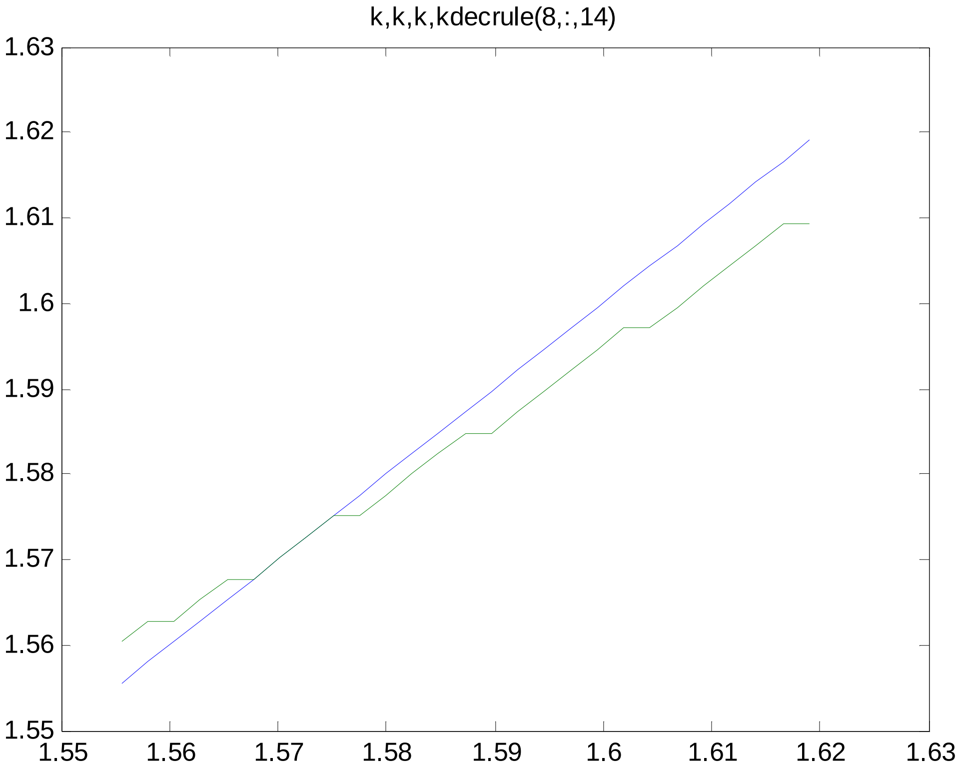
1.62
1.63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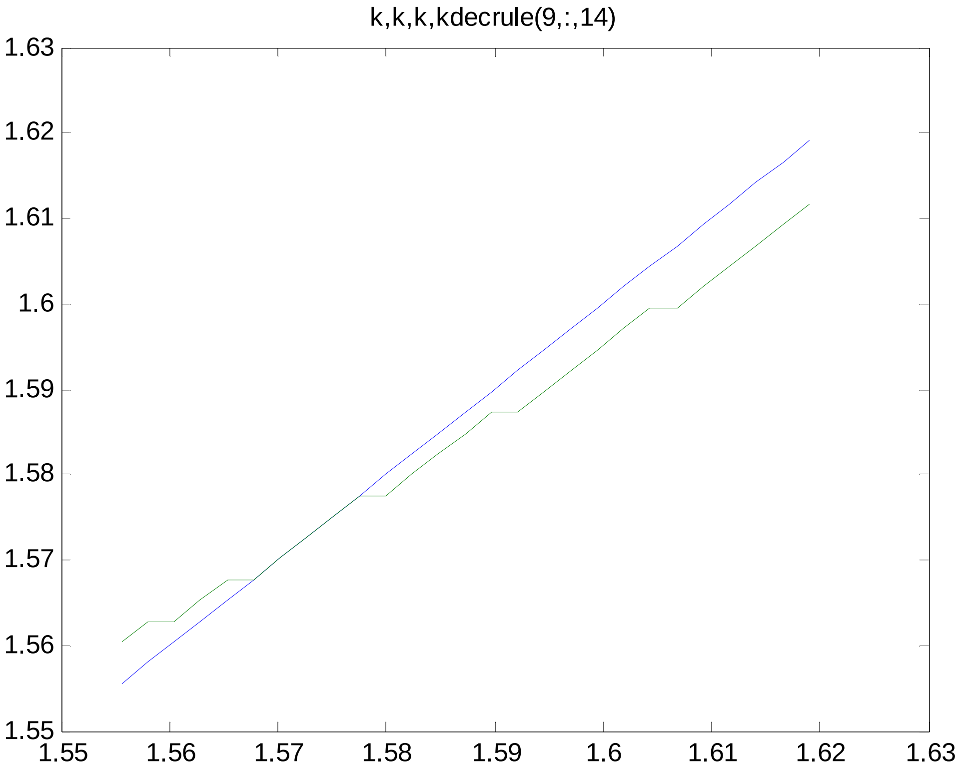
1.63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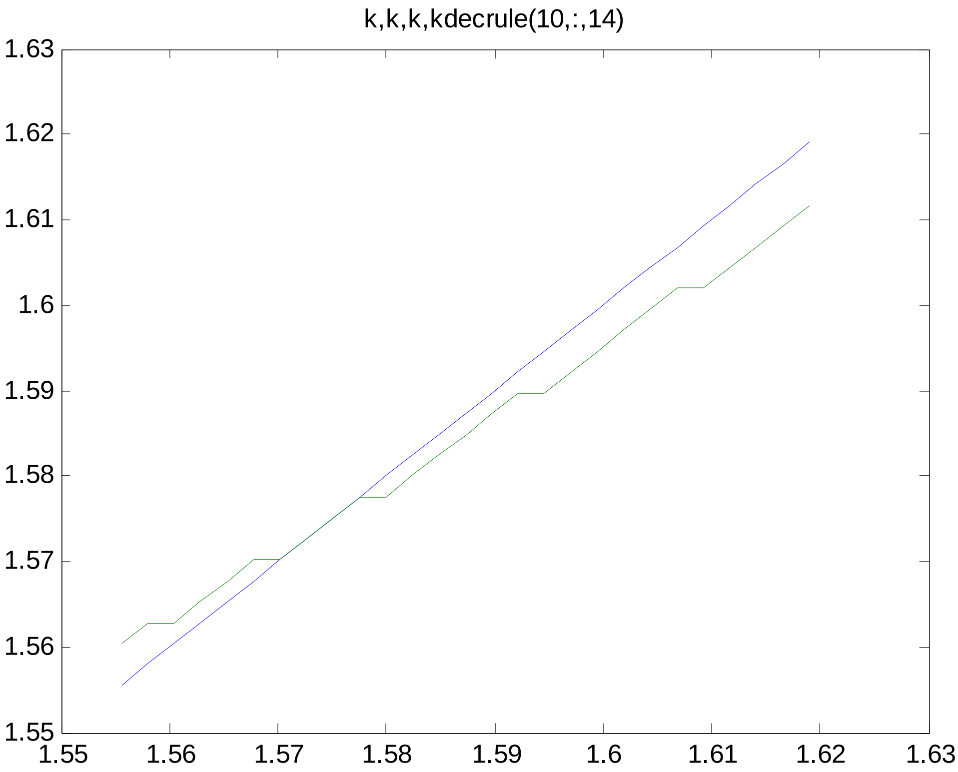
1.63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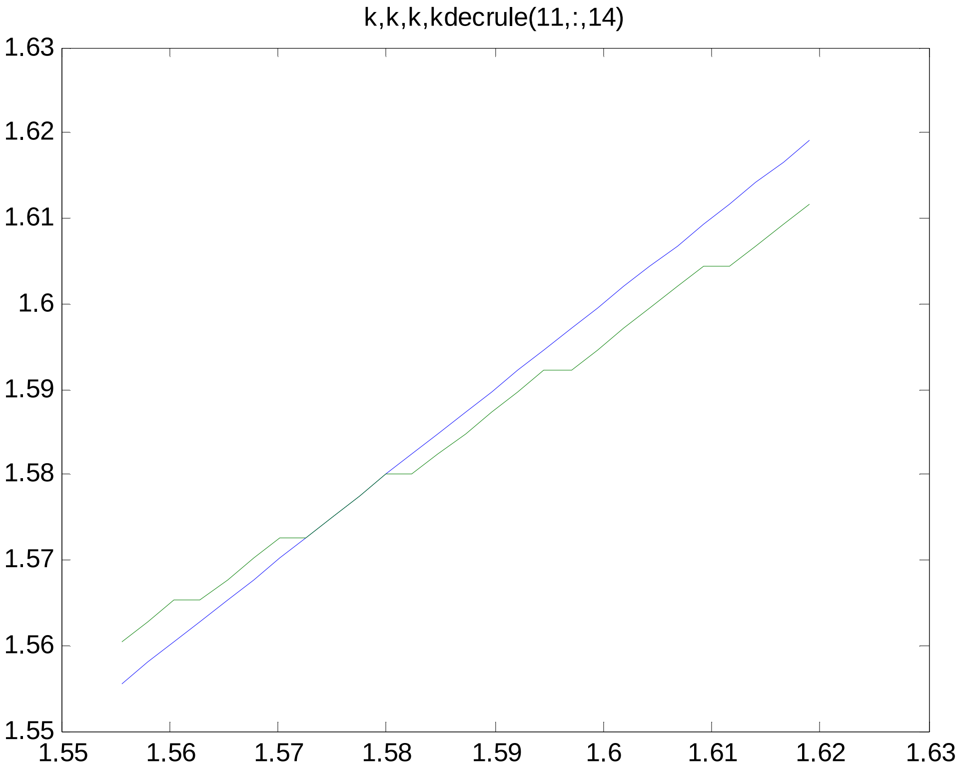
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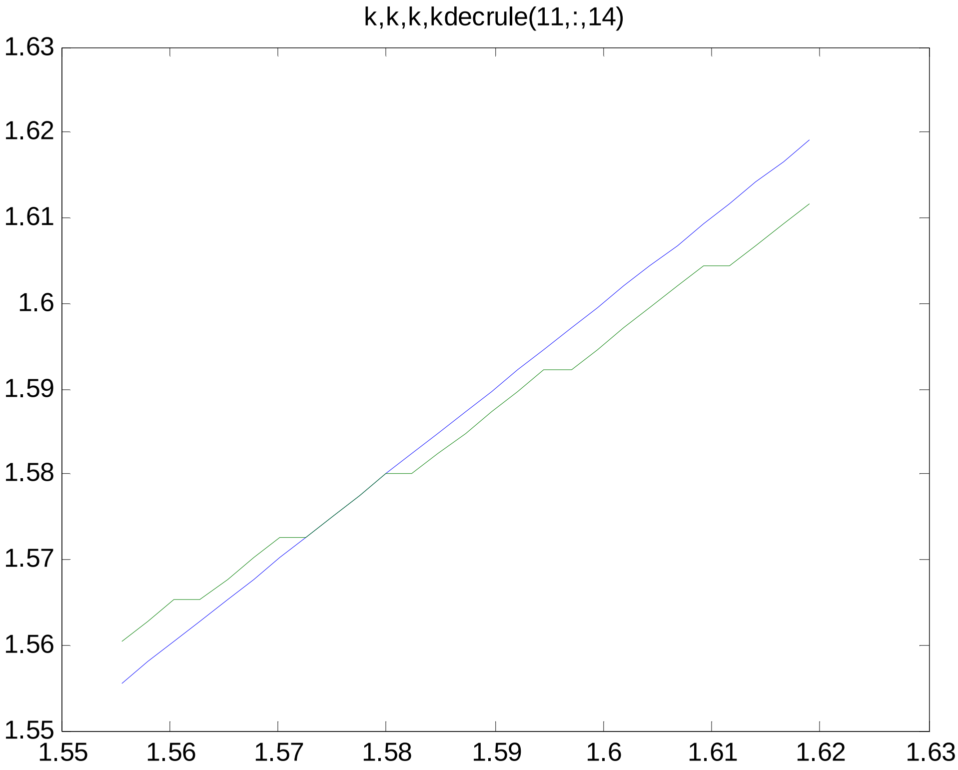
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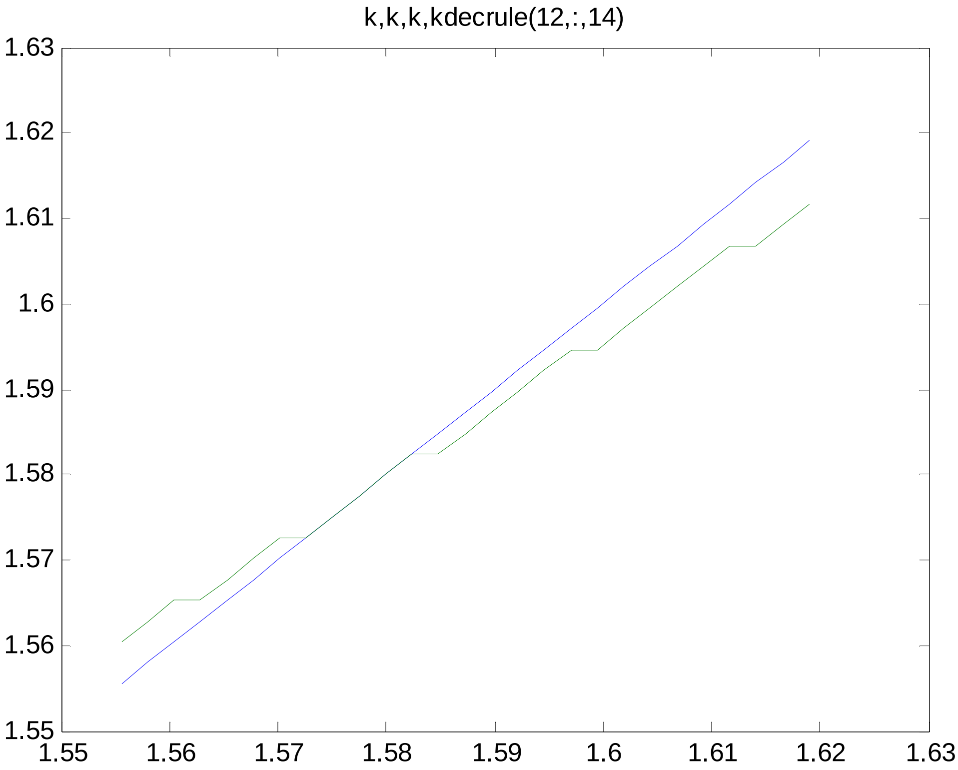
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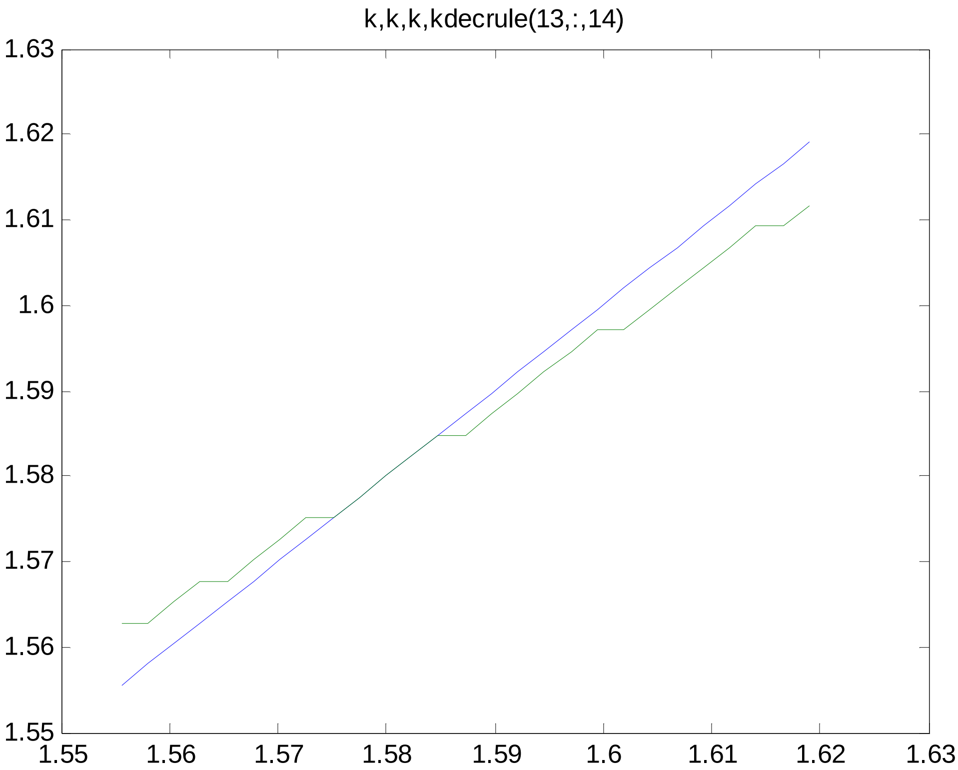
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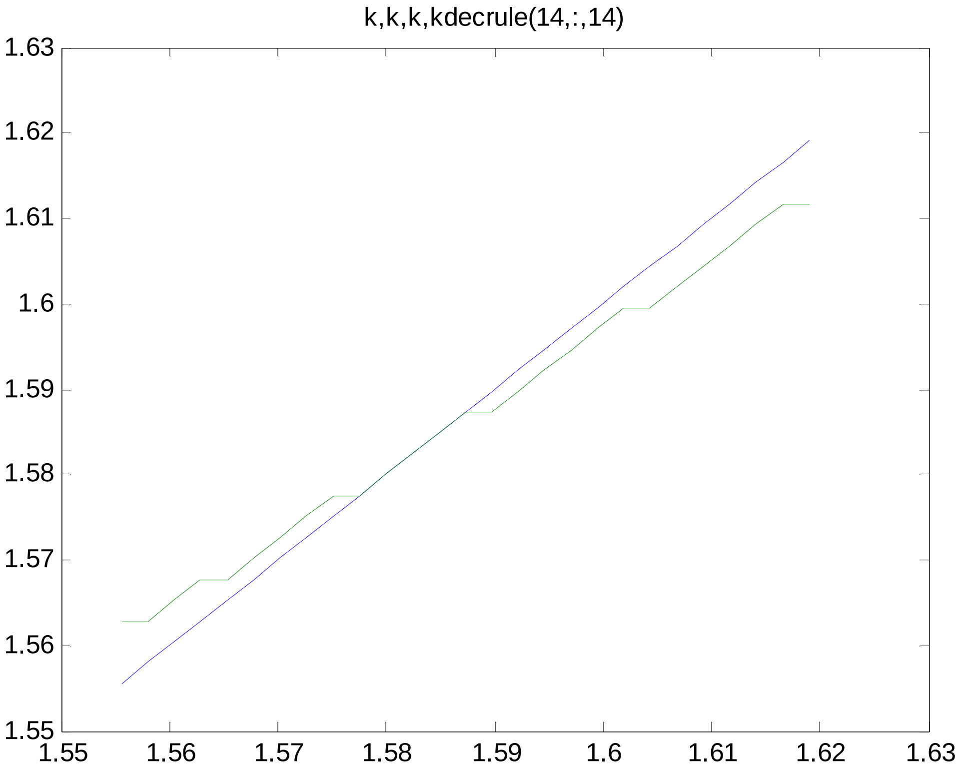
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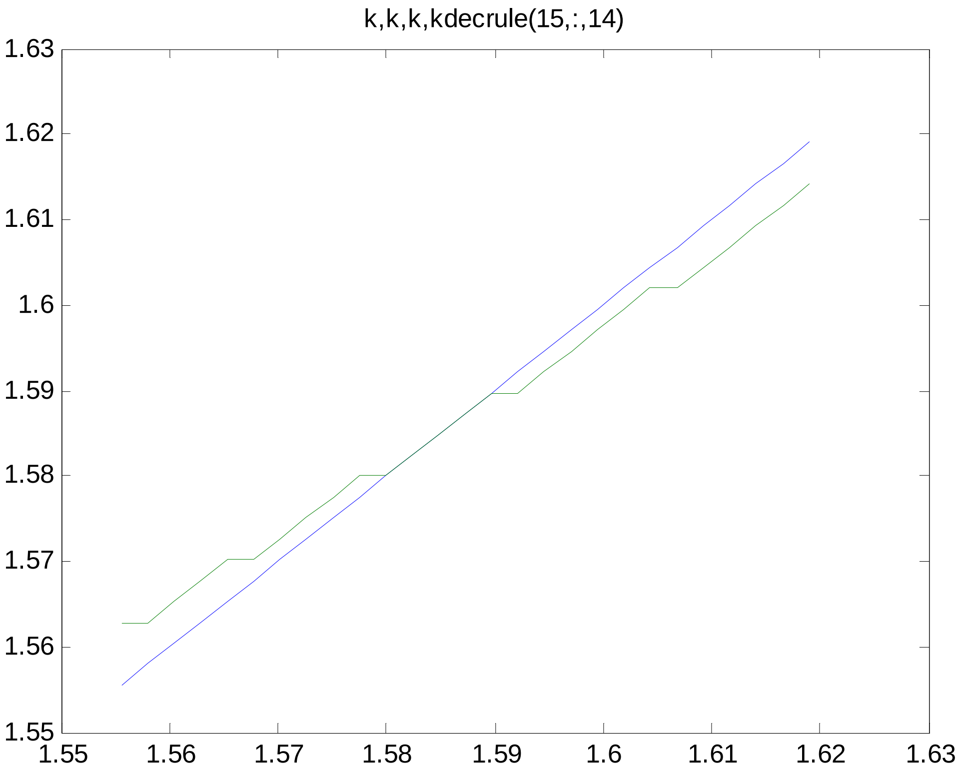
k,k,k,kdecrule(15,:,14)
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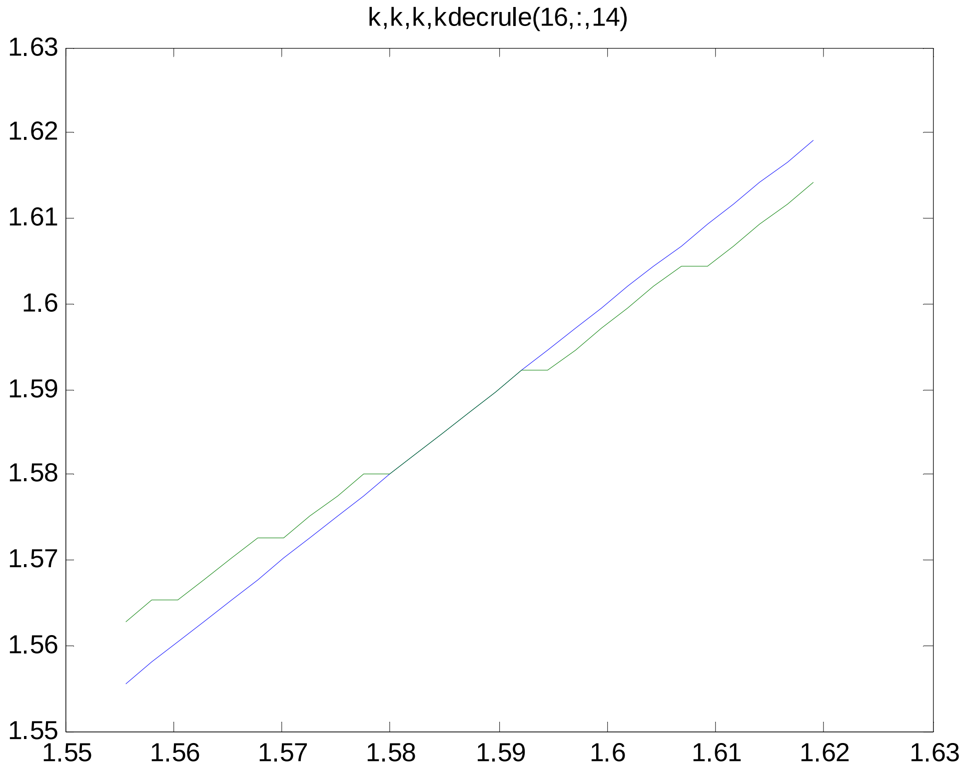
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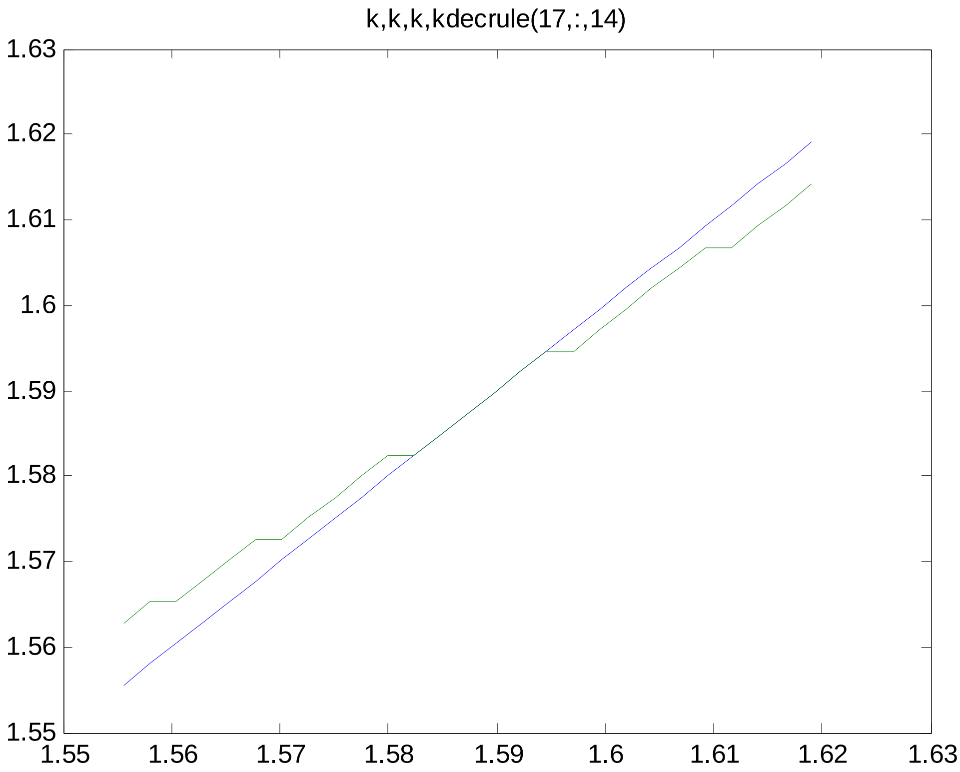
1.63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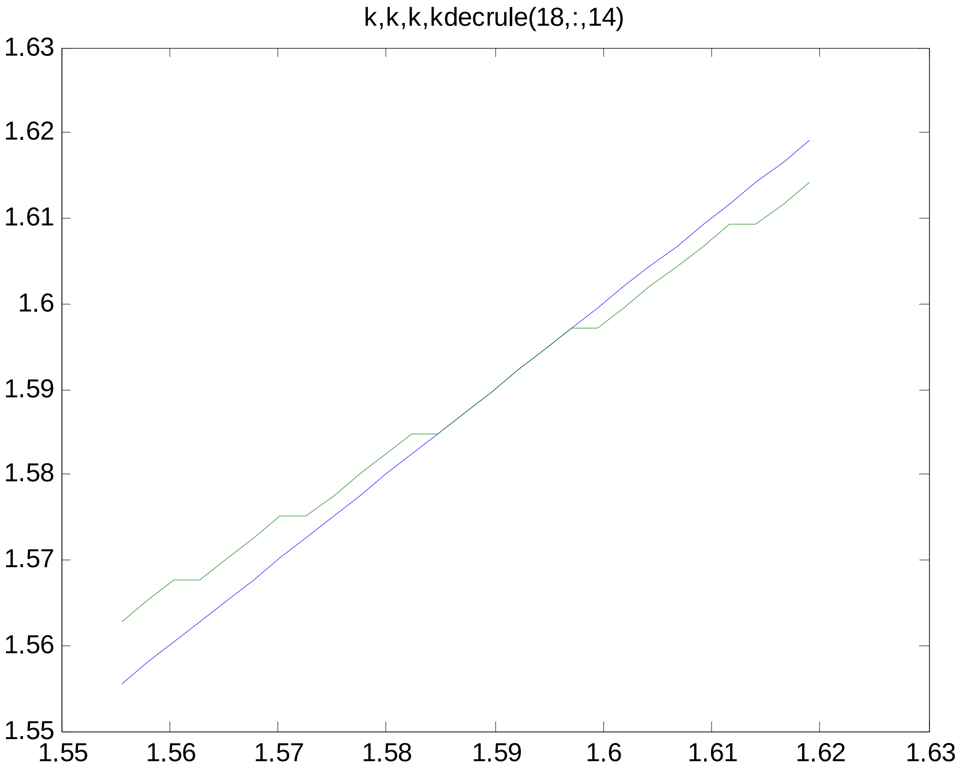
1.63


k,k,k,kdecrule(18,:,14)
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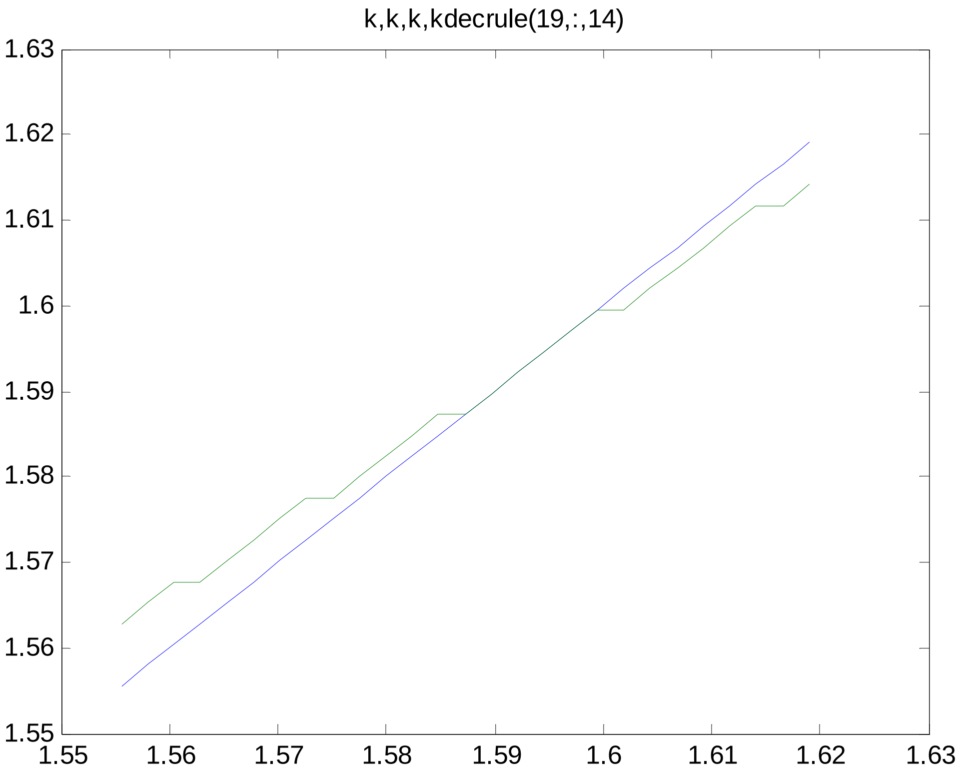
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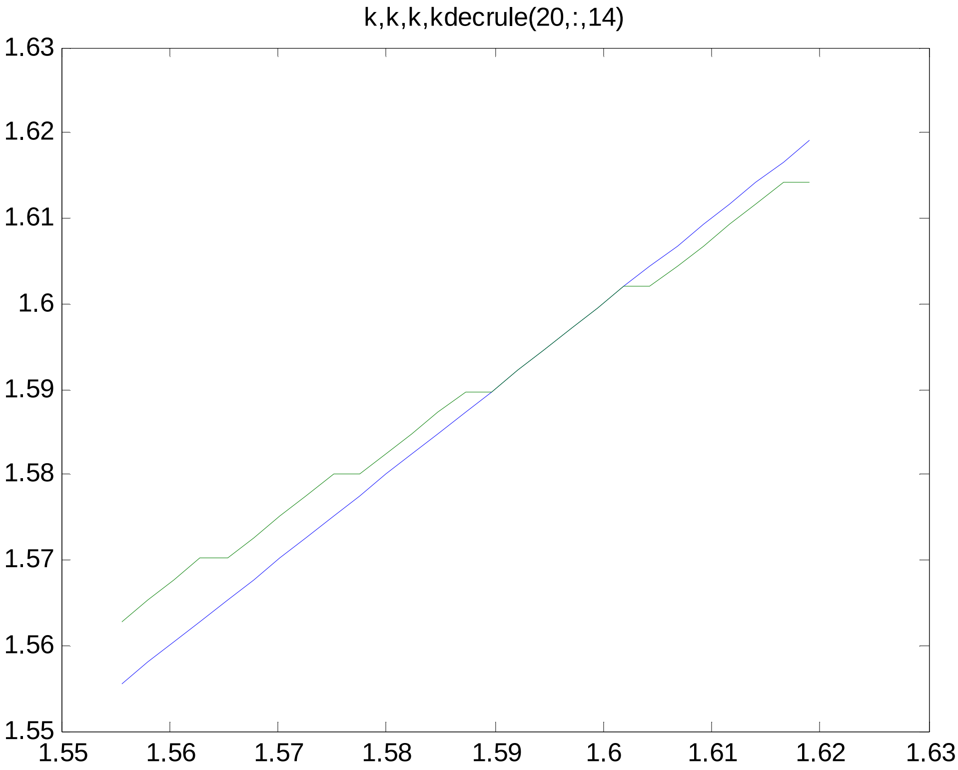
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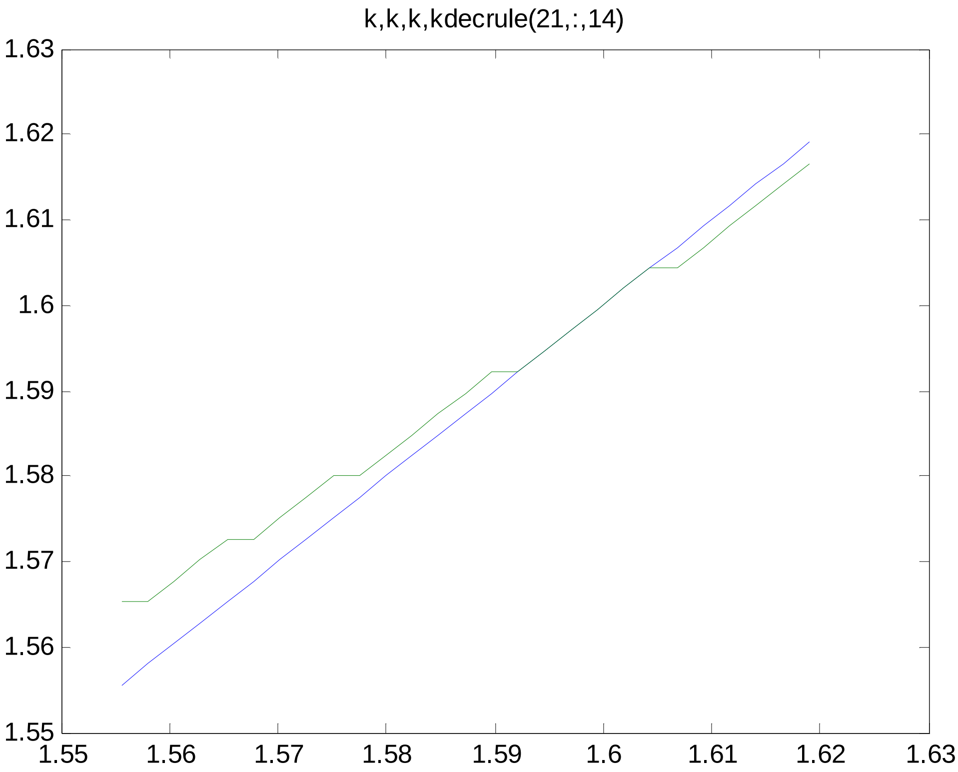
1.62
1.63


k,k,k,kdecrule(21,:,14)
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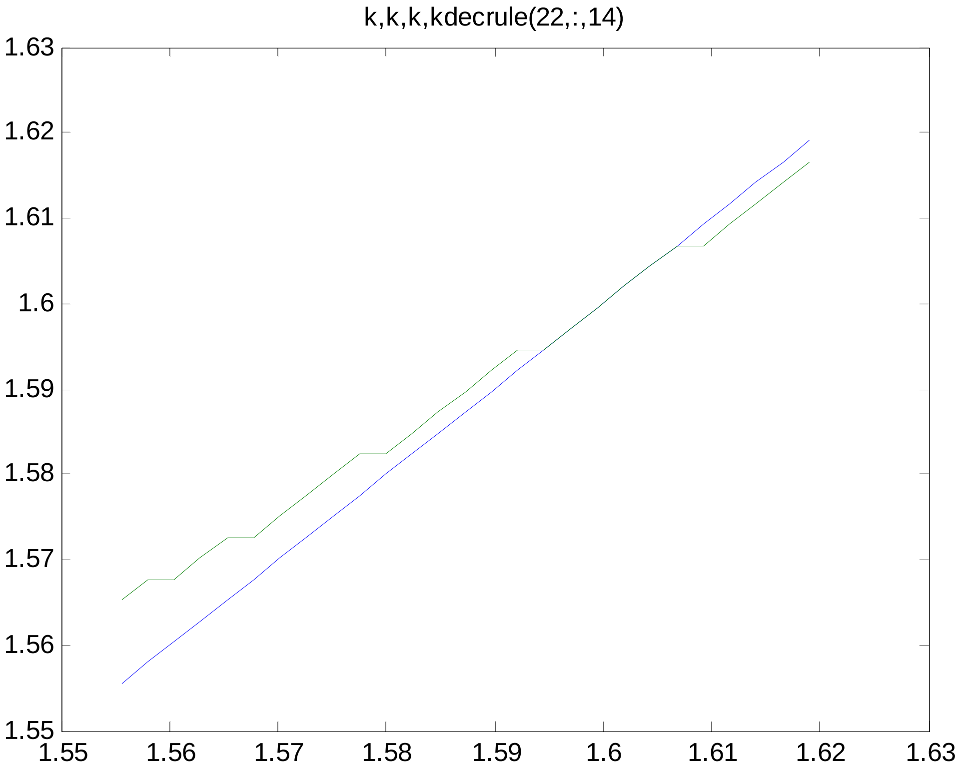
1.63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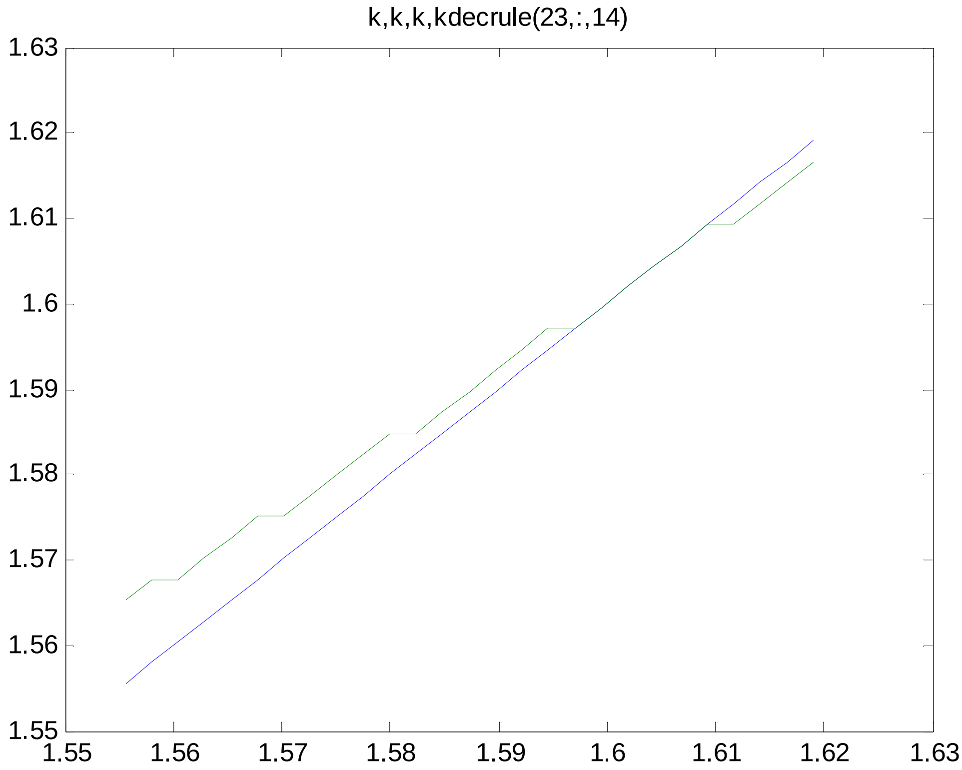
1.62
1.63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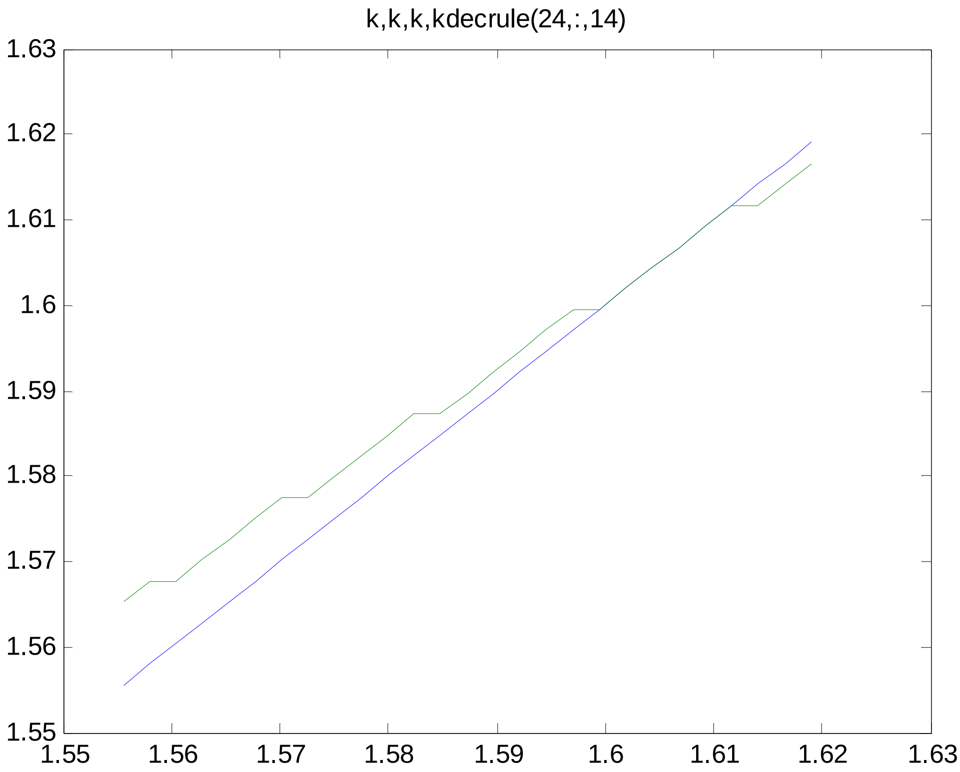
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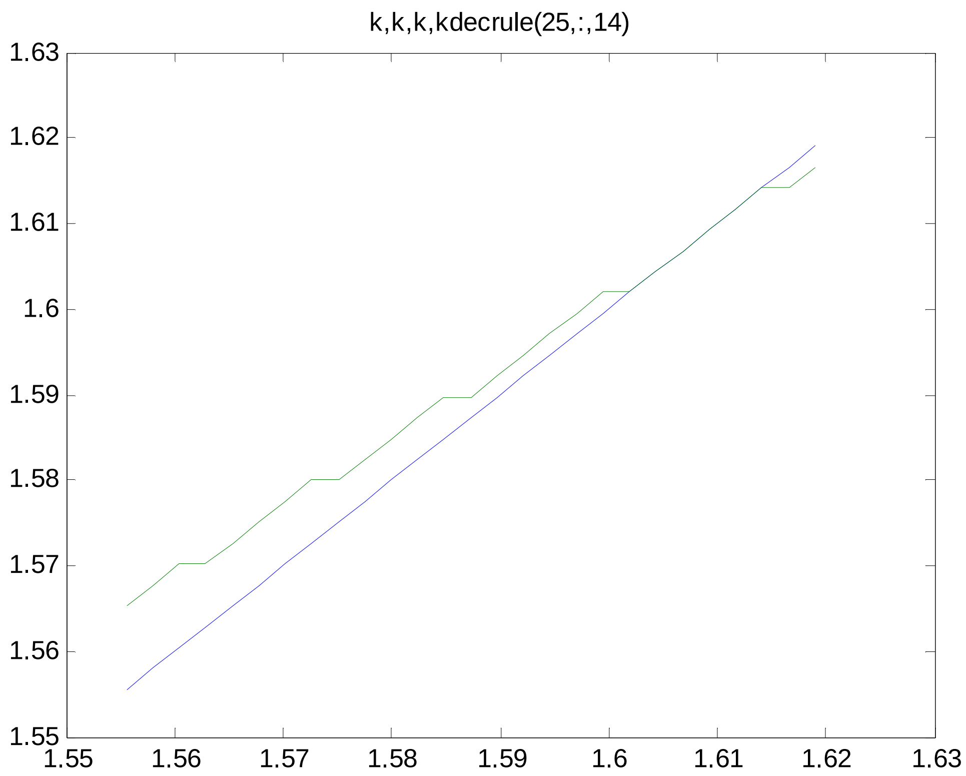
k,k,k,kdecrule(25,:,14)
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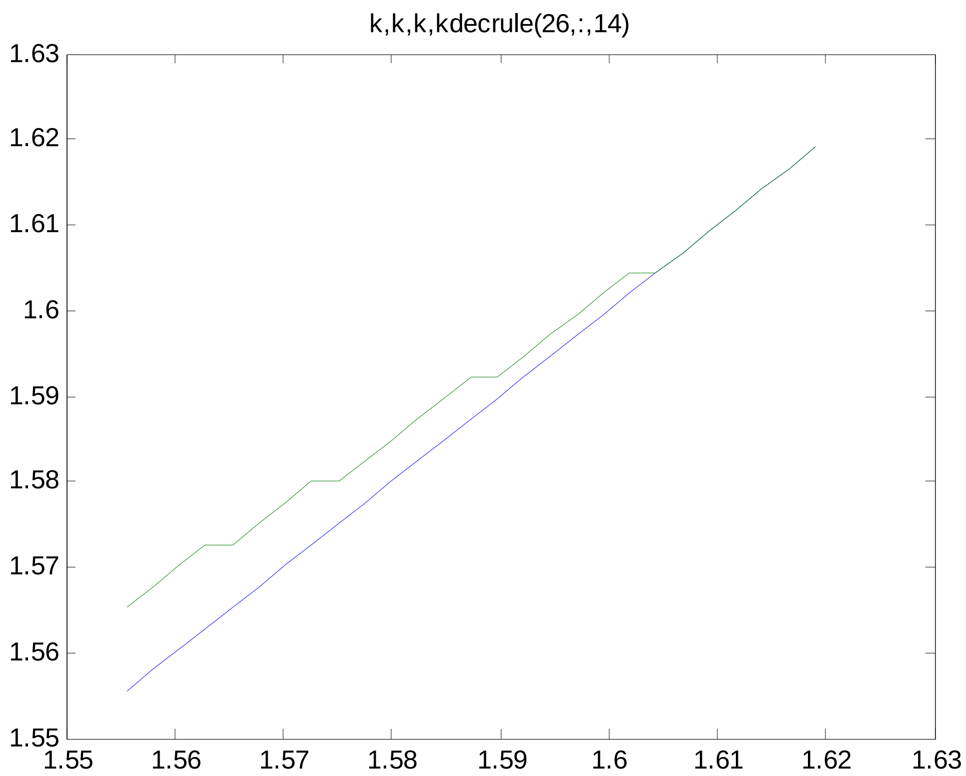
1.63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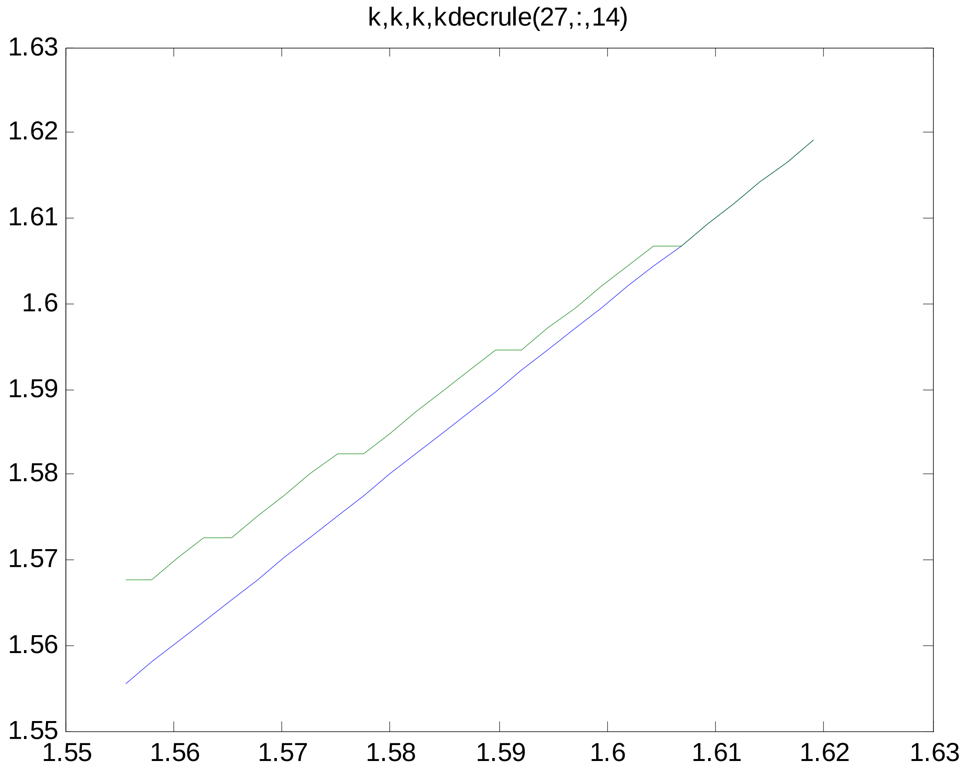
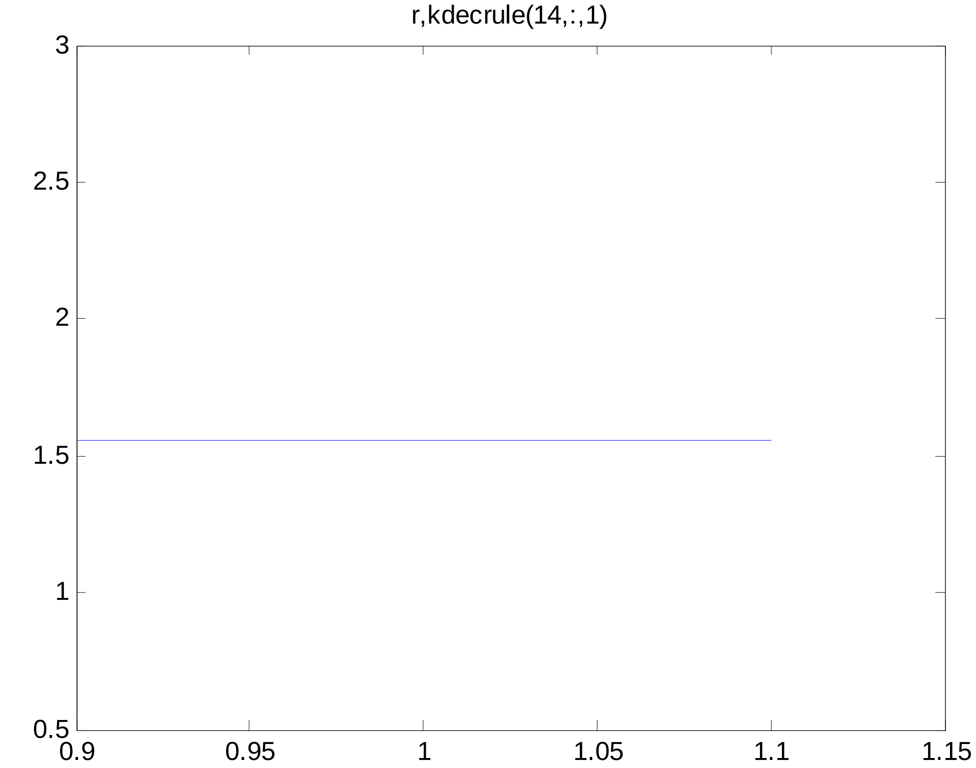
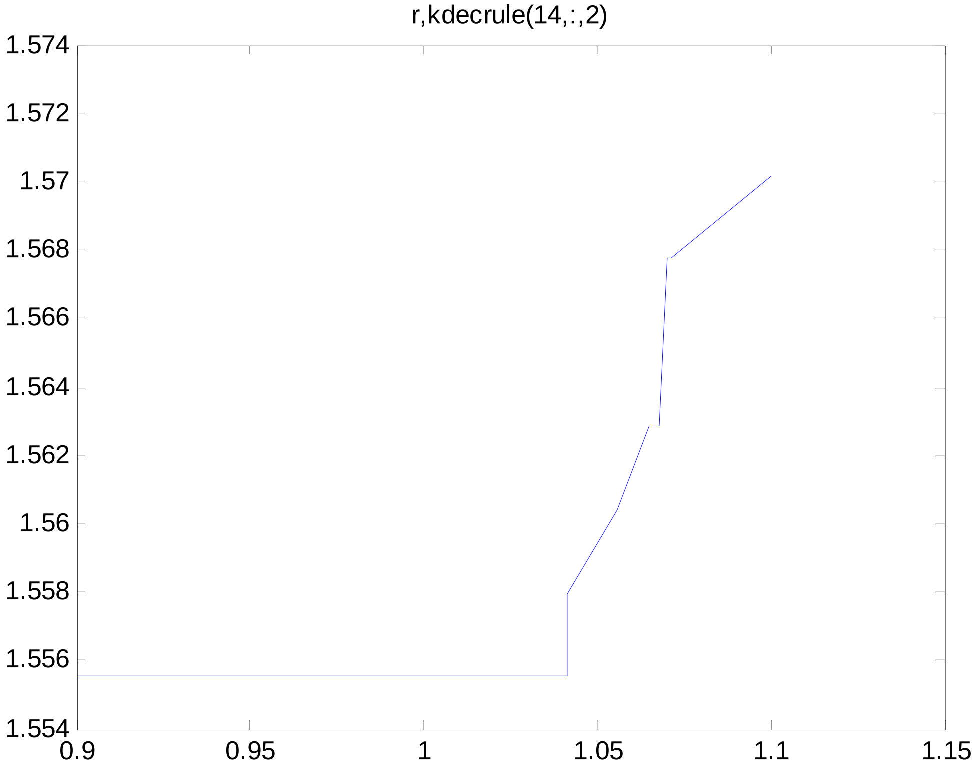
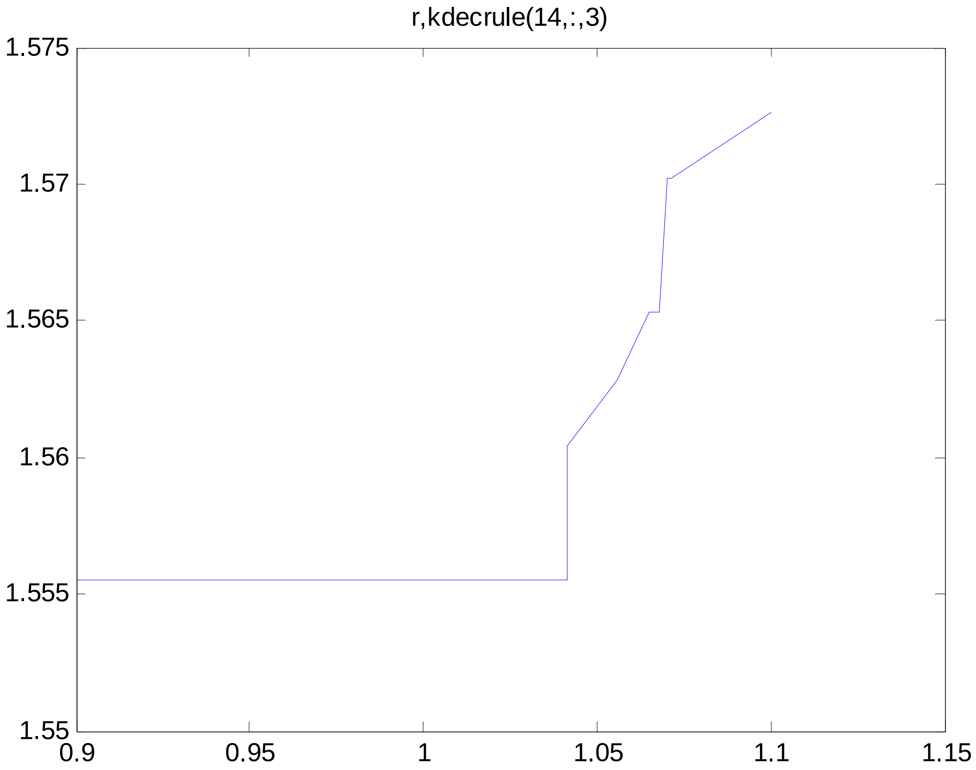
1.57
1.58
1.59
1.6
1.61
1.62
1.63

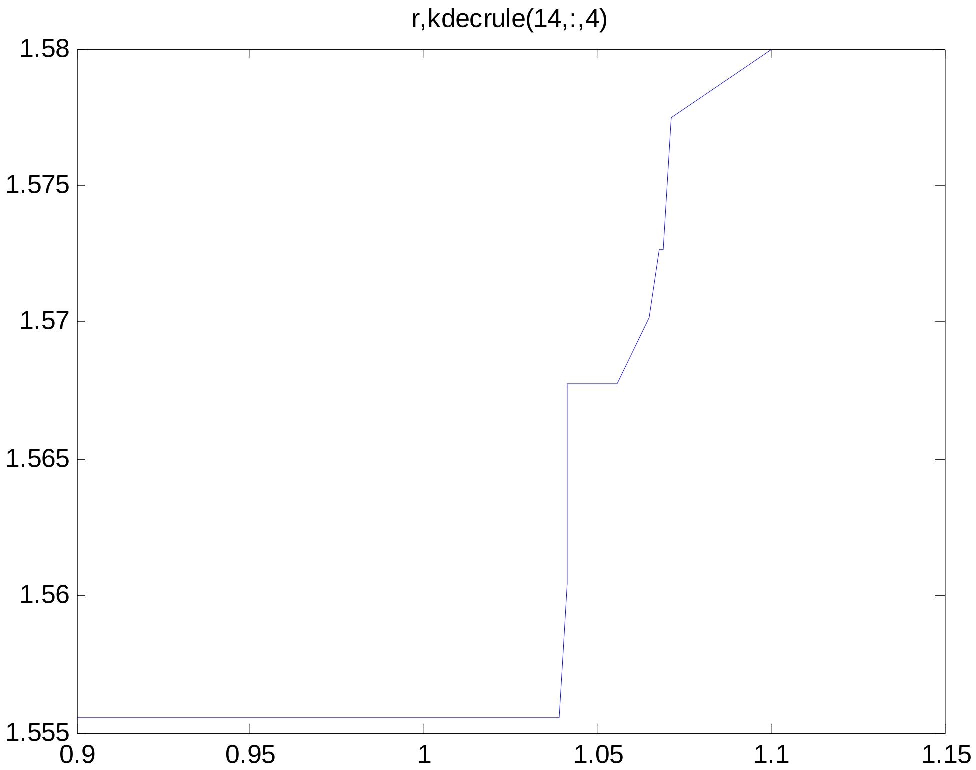

k,k,k,kdecrule(27,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
1.55
1.56
1.57
1.58
1.59
1.6
1.61
1.62
1.63

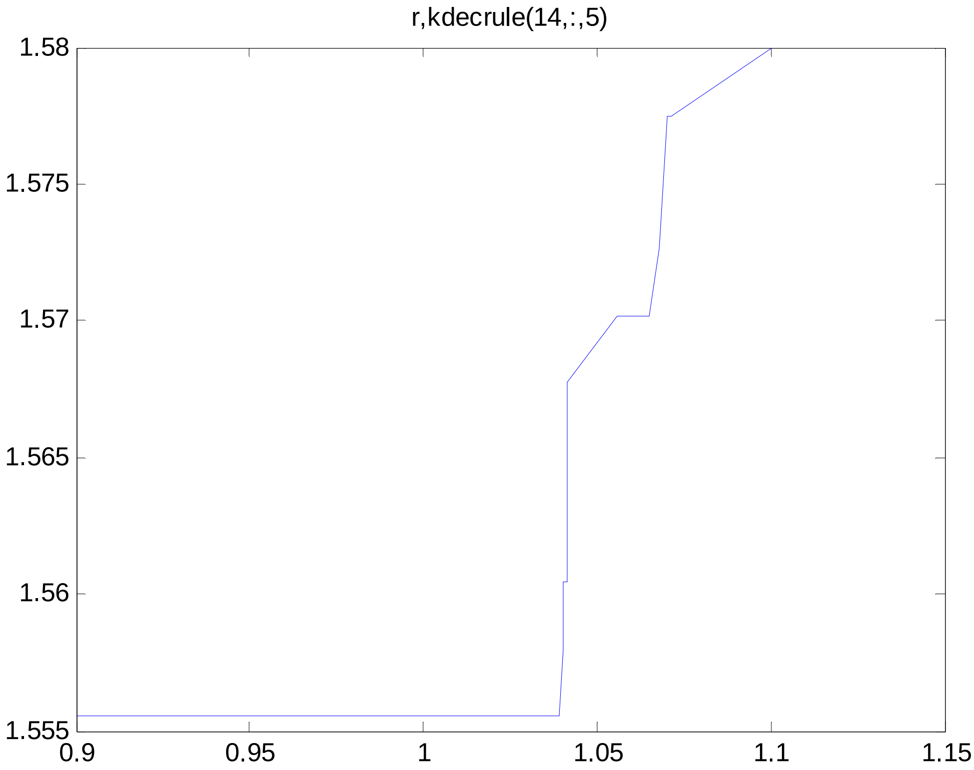
Case_11

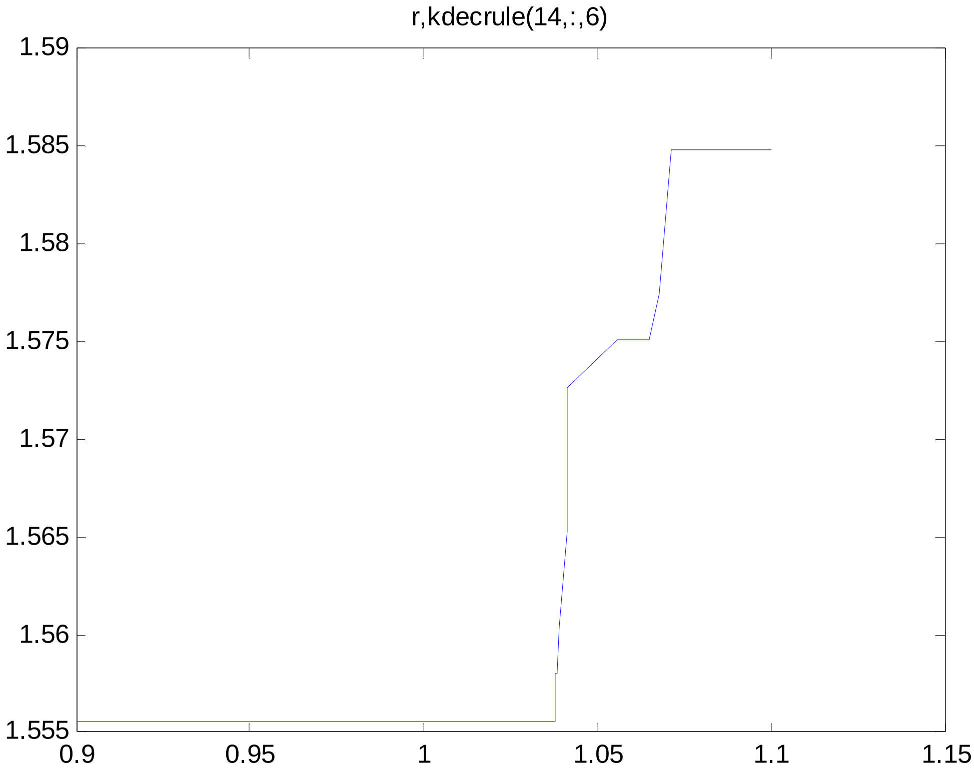

r,kdecrule(14,:,1)
3
2.5
2
1.5
1
0.5
0.9
0.95
1
1.05
1.1
1.15

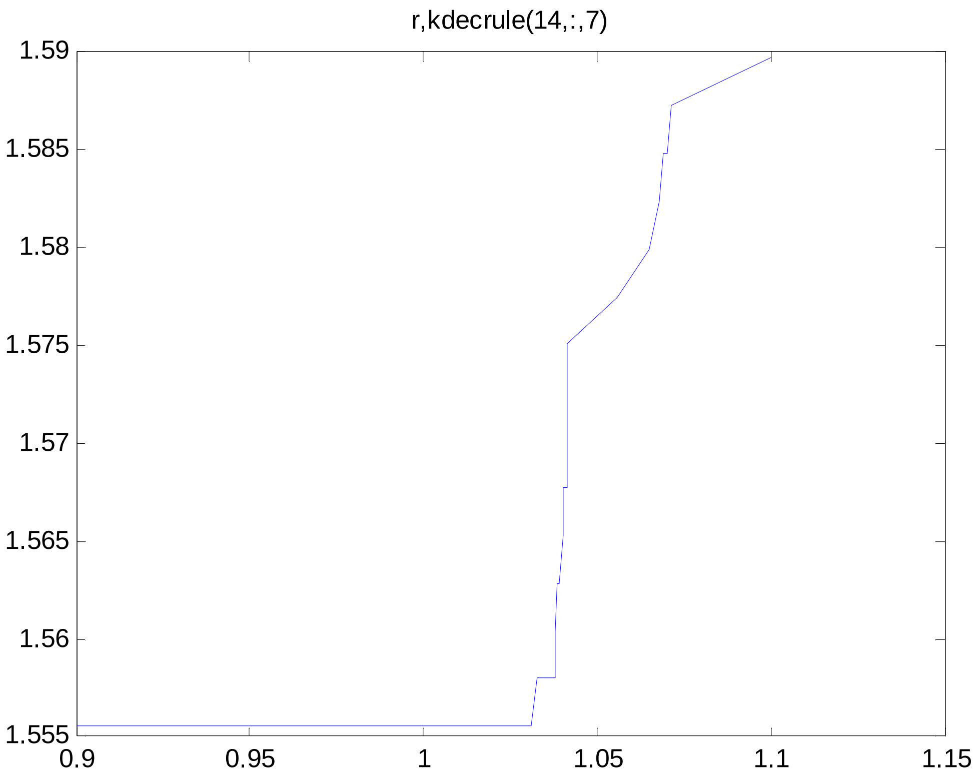

r,kdecrule(14,:,2)
1.574
1.572
1.57
1.568
1.566
1.564
1.562
1.56
1.558
1.556
1.554
0.9
0.95
1
1.05
1.1
1.15

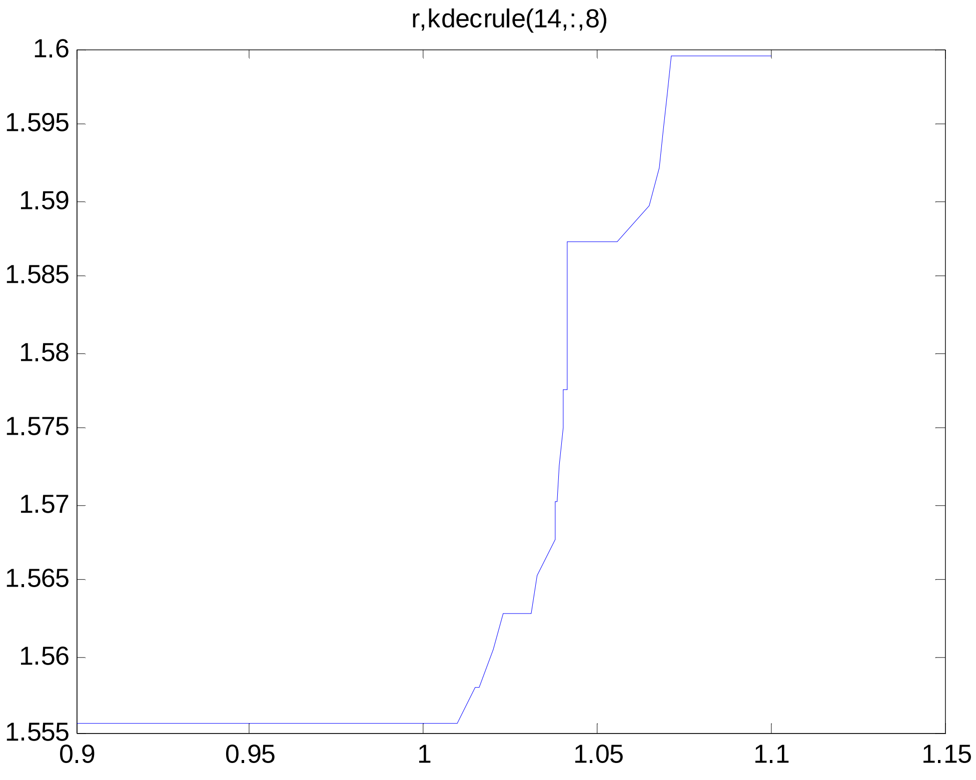

r,kdecrule(14,:,3)
1.575
1.57
1.565
1.56
1.555
1.55
0.9
0.95
1
1.05
1.1
1.15

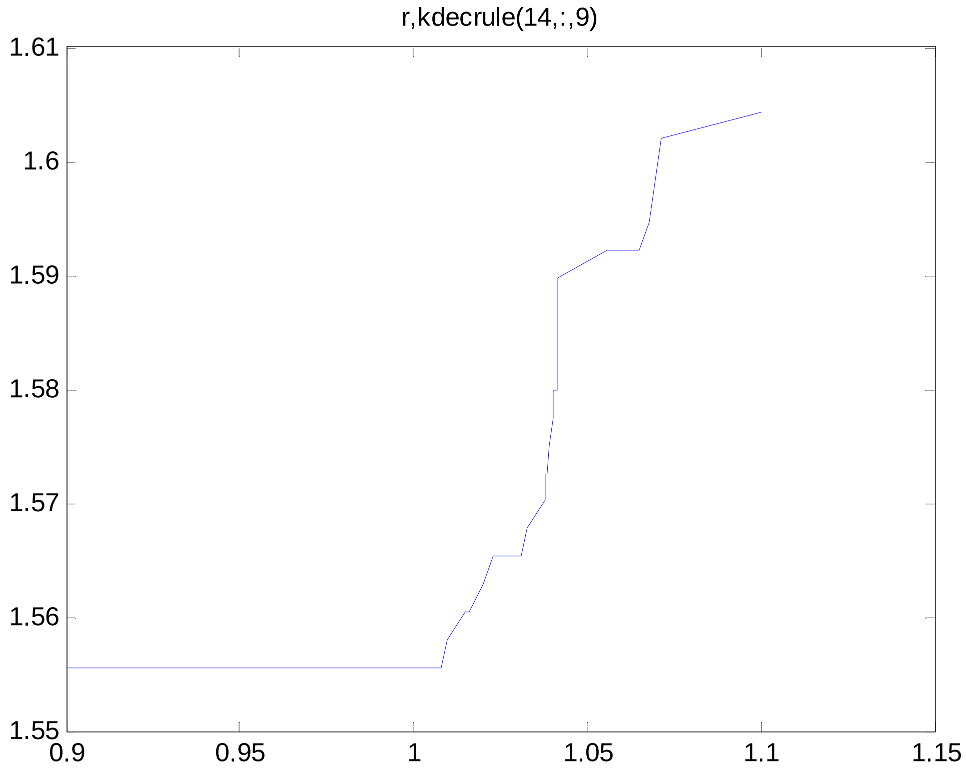

r,kdecrule(14,:,4)
1.58
1.575
1.57
1.565
1.56
1.555
0.9
0.95
1
1.05
1.1
1.15

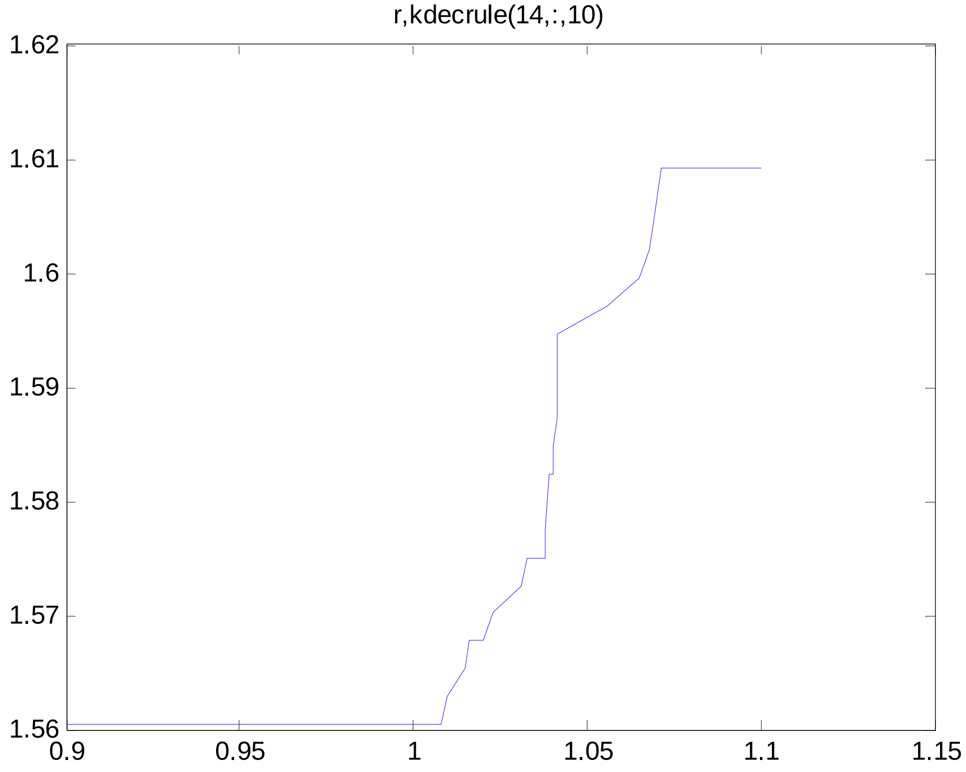

r,kdecrule(14,:,5)
1.58
1.575
1.57
1.565
1.56
1.555
0.9
0.95
1
1.05
1.1
1.15

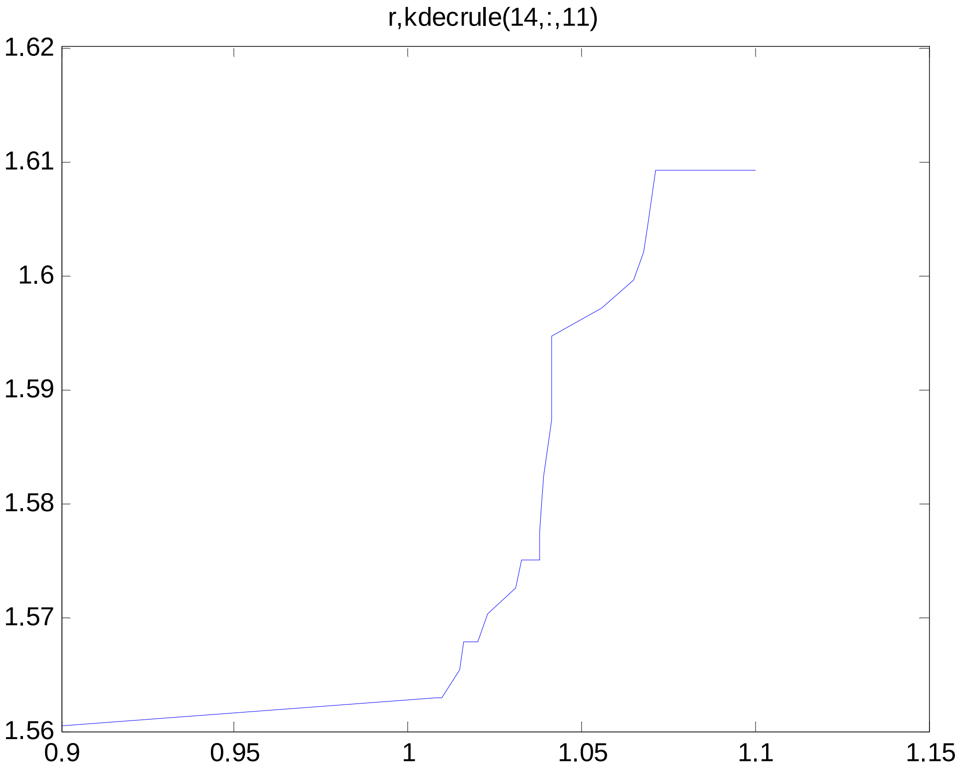

r,kdecrule(14,:,6)
1.59
1.585
1.58
1.575
1.57
1.565
1.56
1.555
0.9
0.95
1
1.05
1.1
1.15

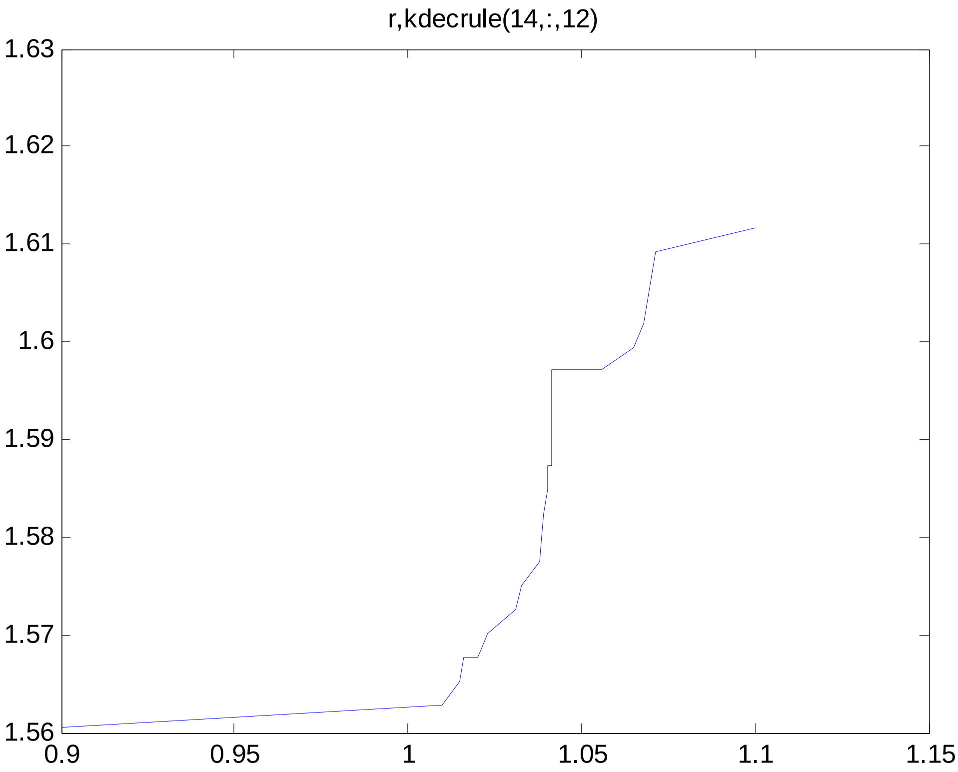

r,kdecrule(14,:,7)
1.59
1.585
1.58
1.575
1.57
1.565
1.56
1.555
0.9
0.95
1
1.05
1.1
1.15

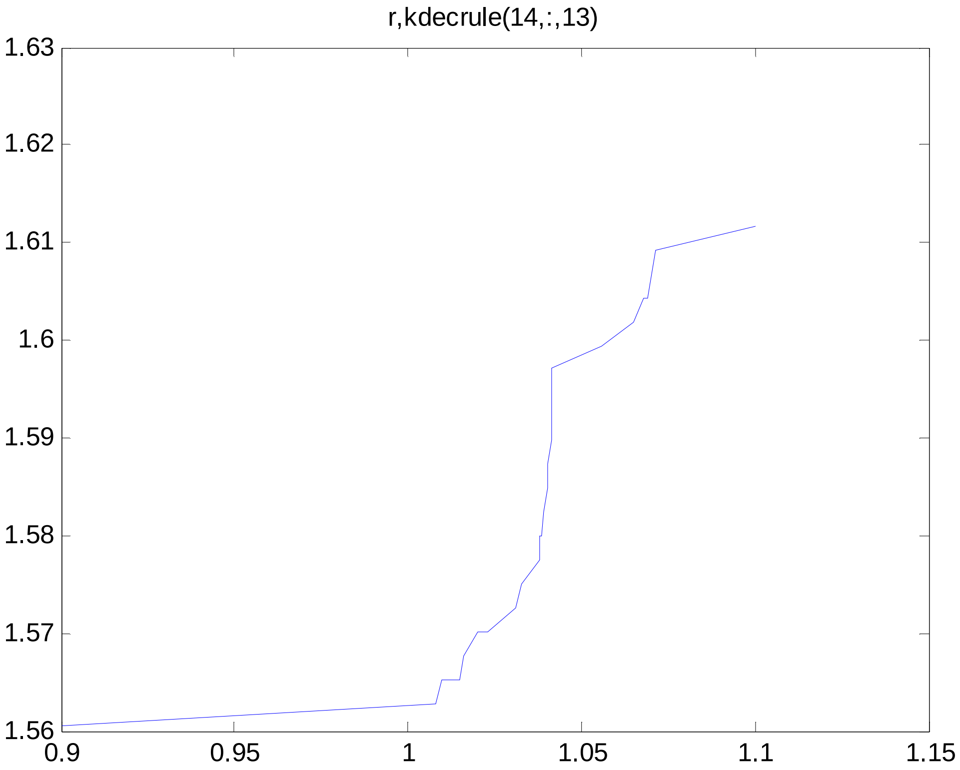

r,kdecrule(14,:,8)
1.6
1.595
1.59
1.585
1.58
1.575
1.57
1.565
1.56
1.555
0.9
0.95
1
1.05
1.1
1.15

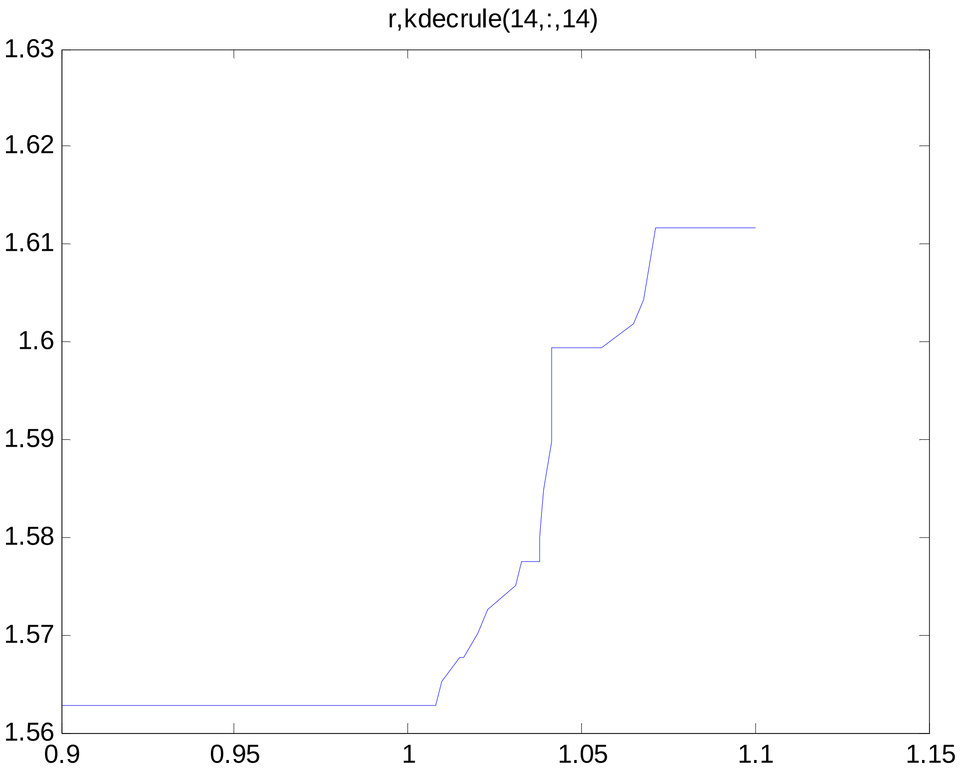

r,kdecrule(14,:,9)
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15

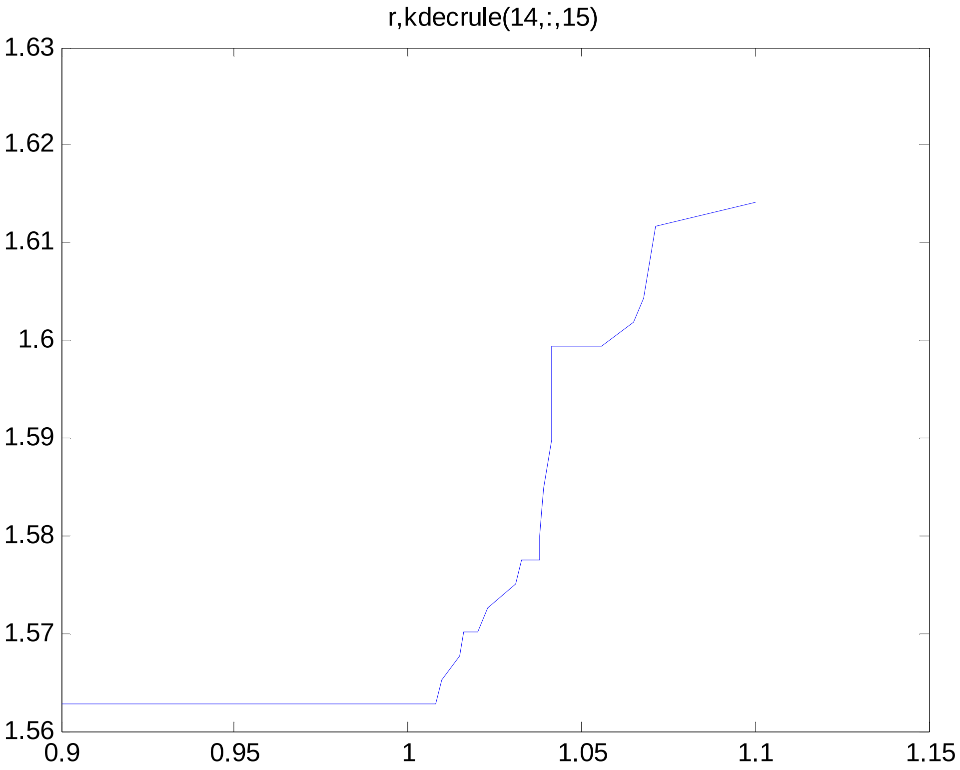

r,kdecrule(14,:,10)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

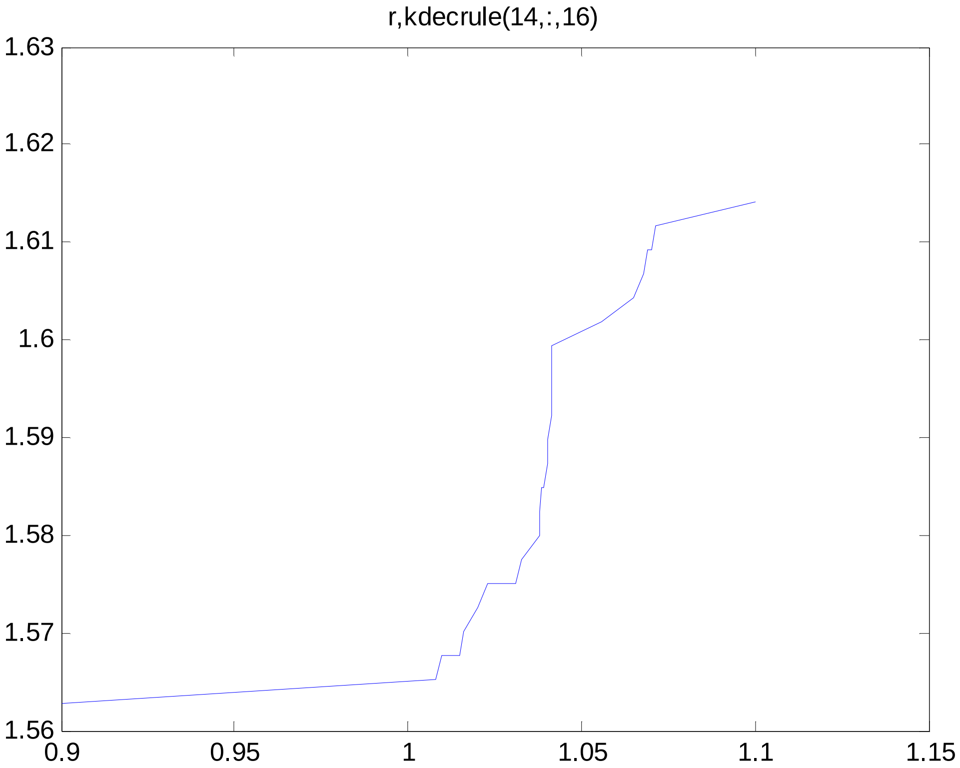

r,kdecrule(14,:,11)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

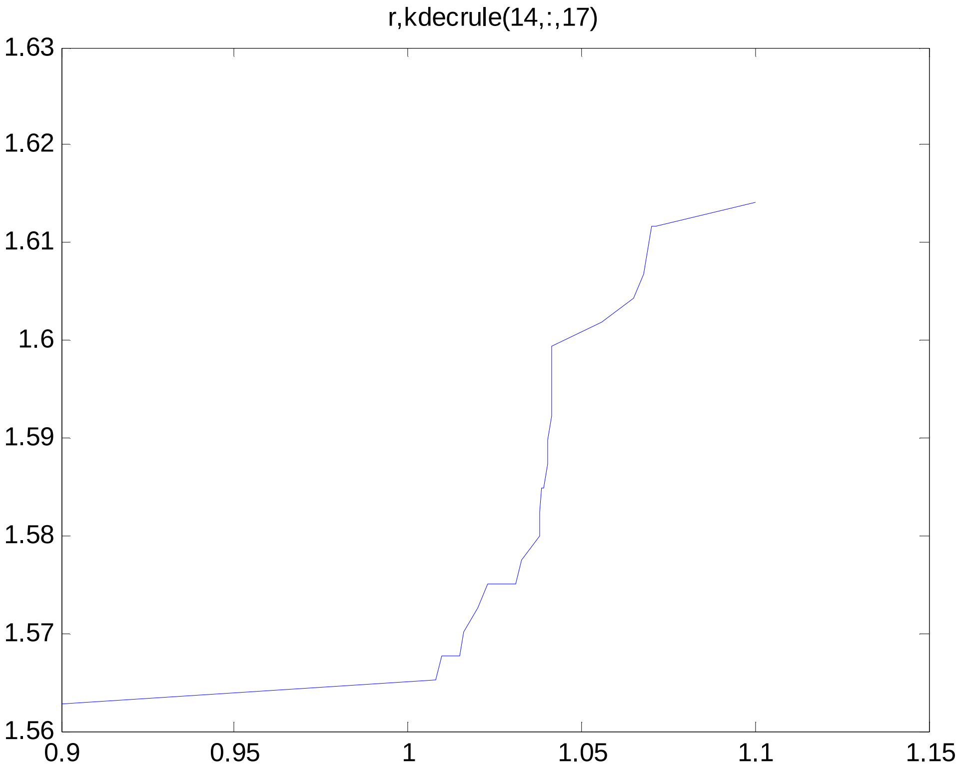

r,kdecrule(14,:,12)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

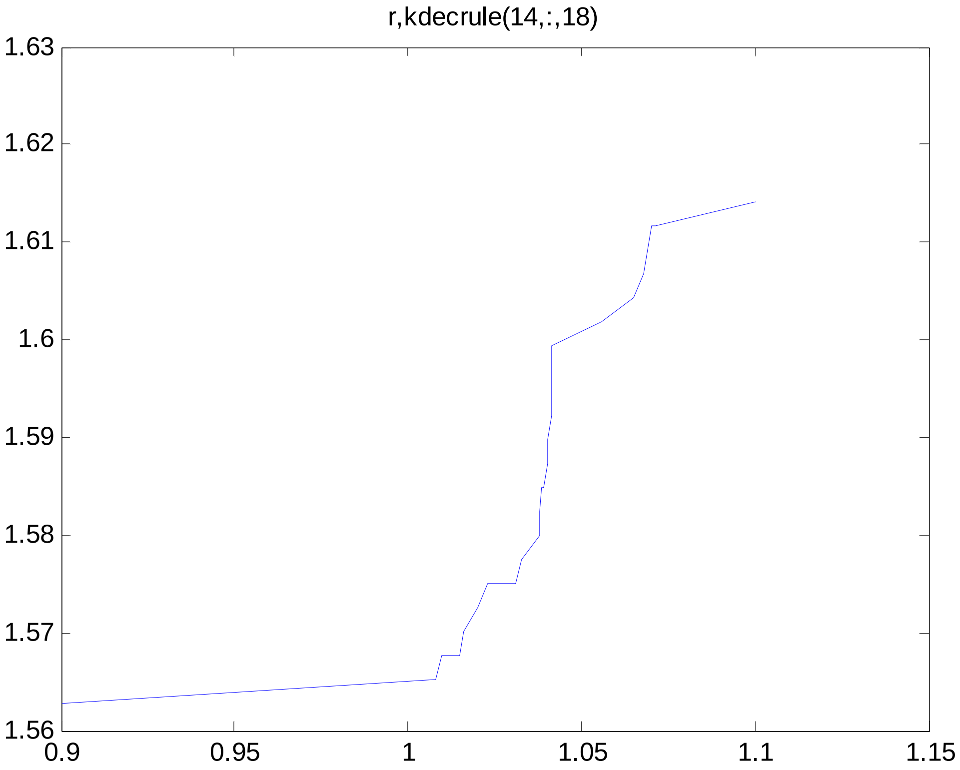

r,kdecrule(14,:,13)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

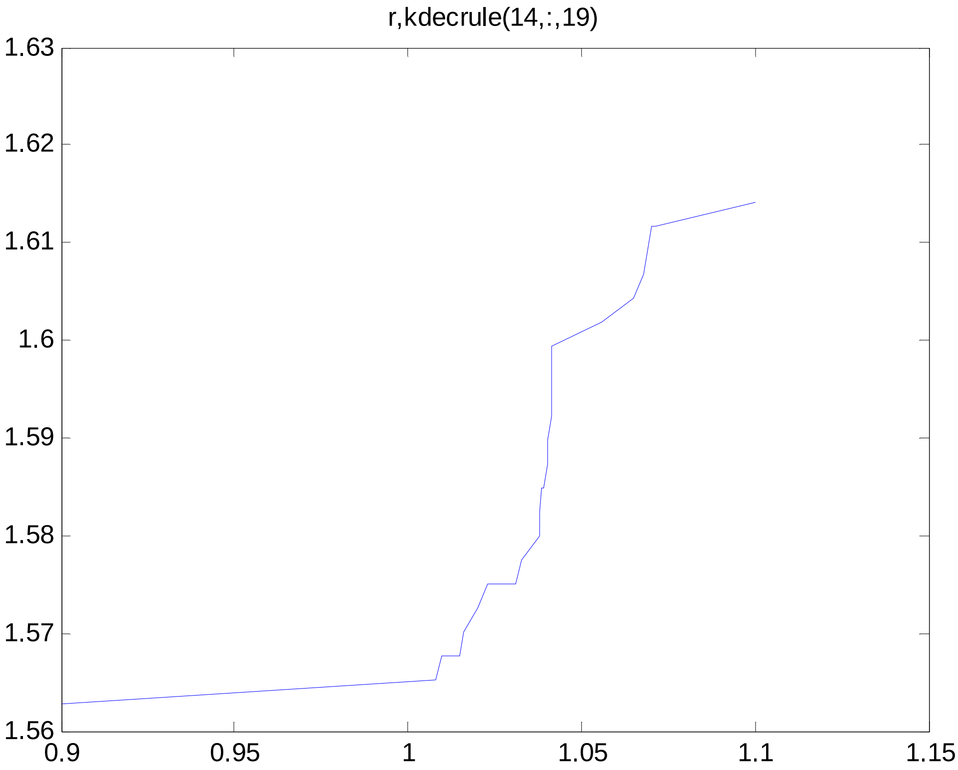

r,kdecrule(14,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

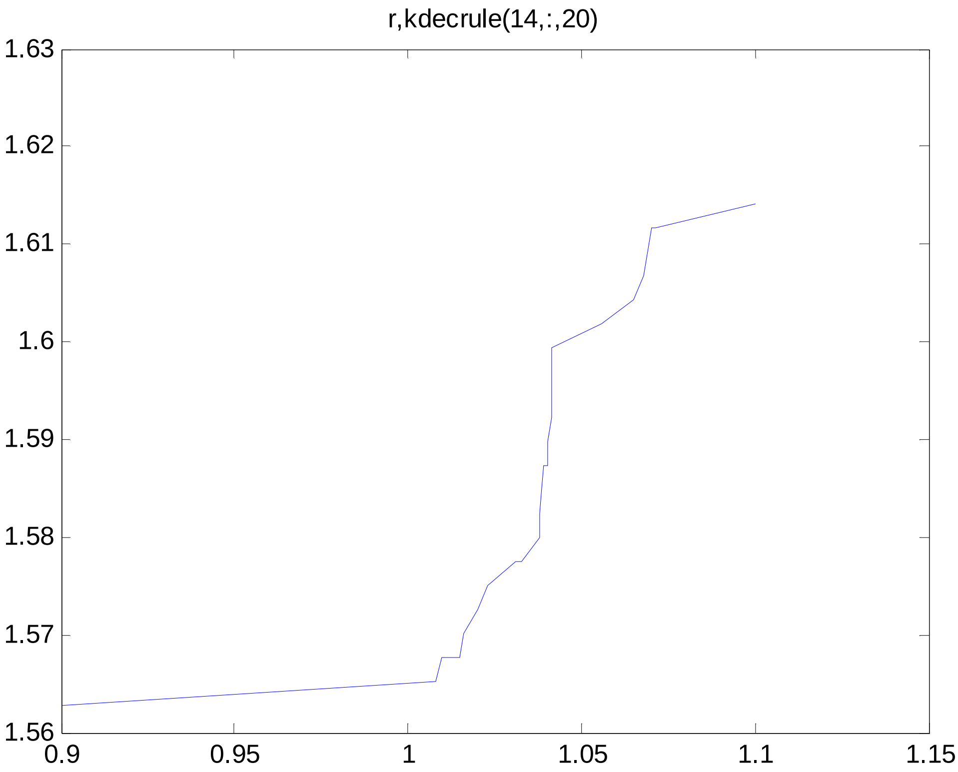

r,kdecrule(14,:,15)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

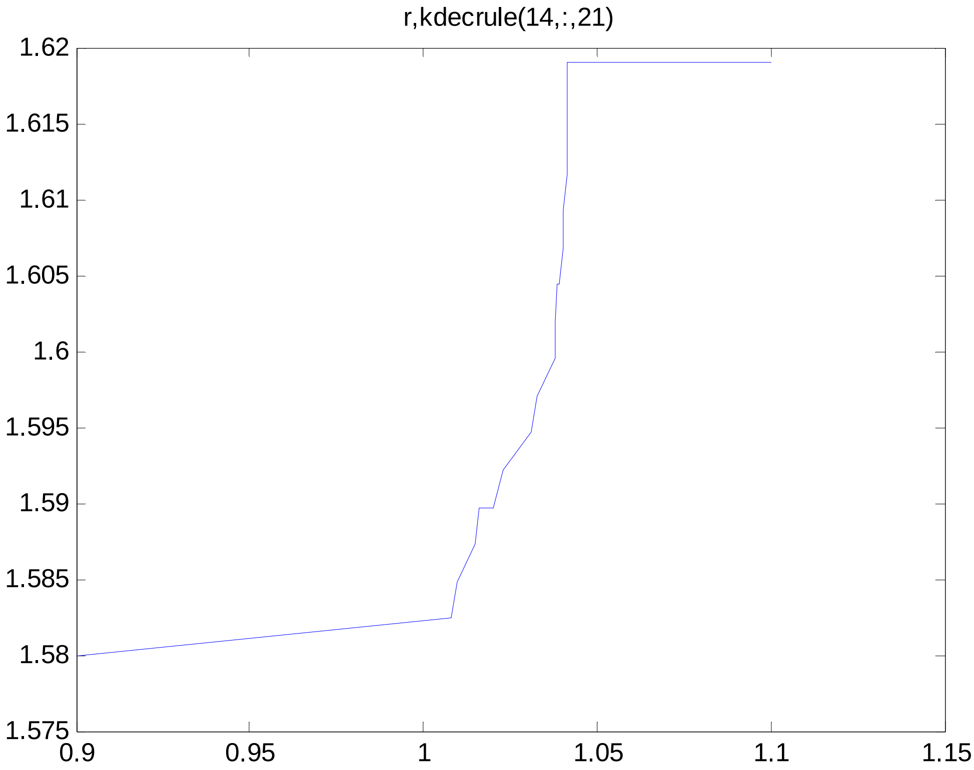

r,kdecrule(14,:,16)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(14,:,17)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

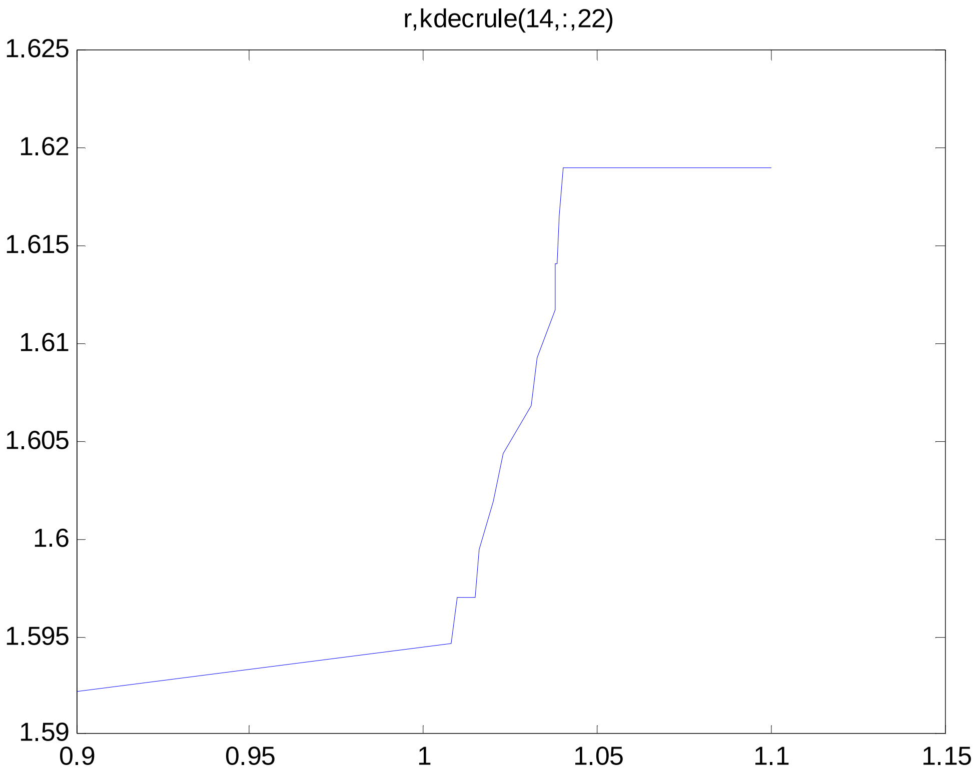

r,kdecrule(14,:,18)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(14,:,19)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

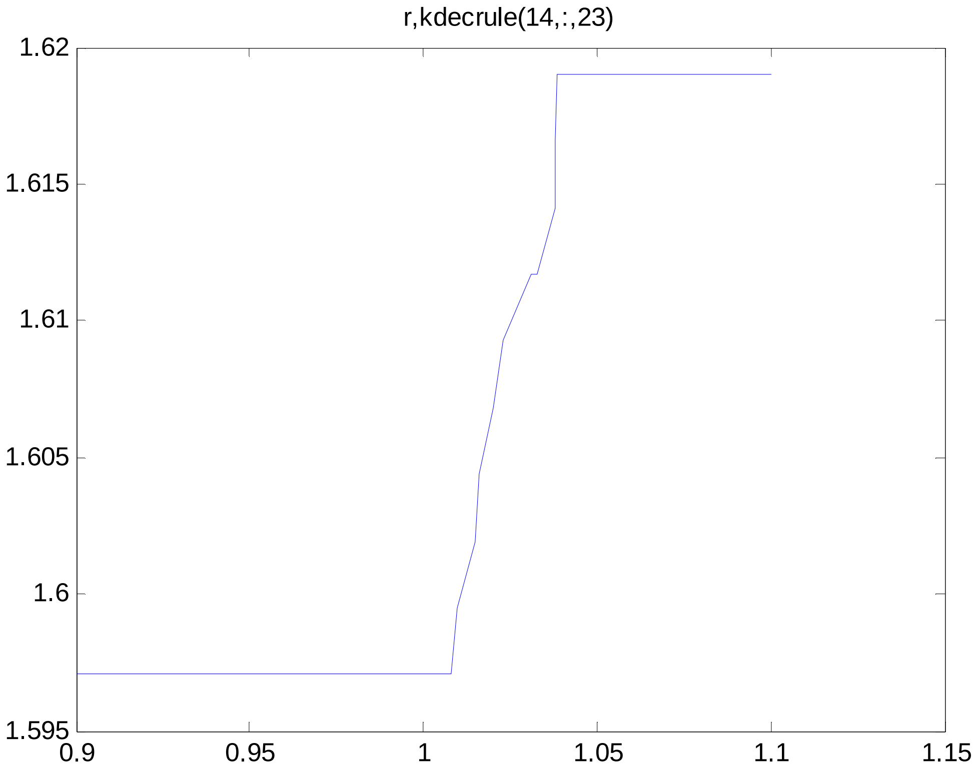

r,kdecrule(14,:,20)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

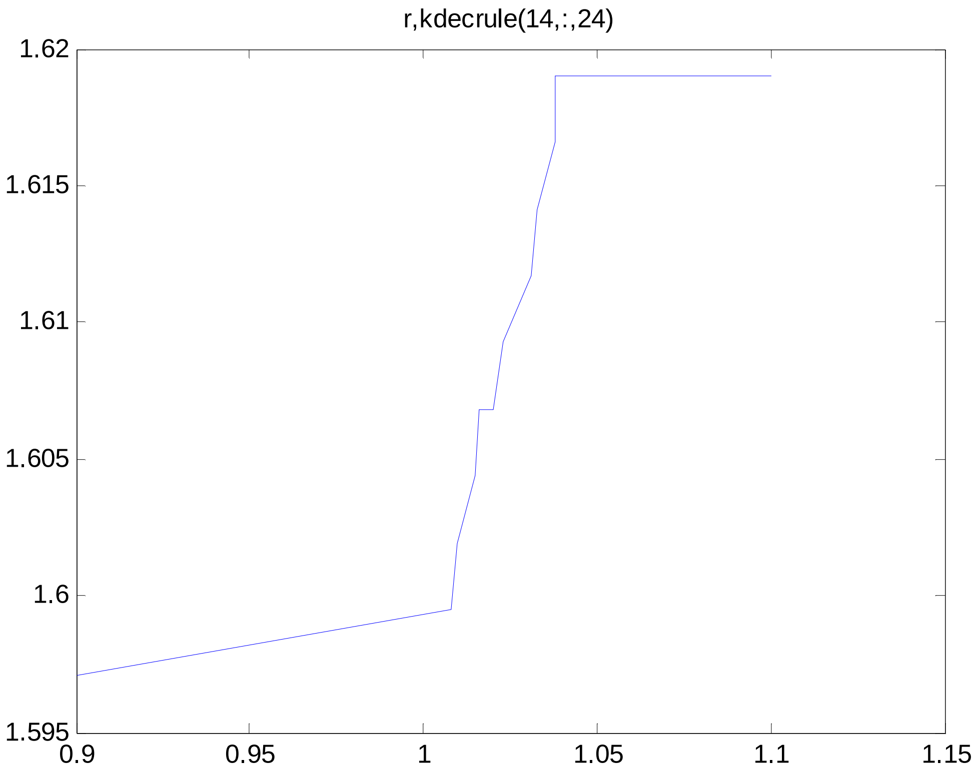


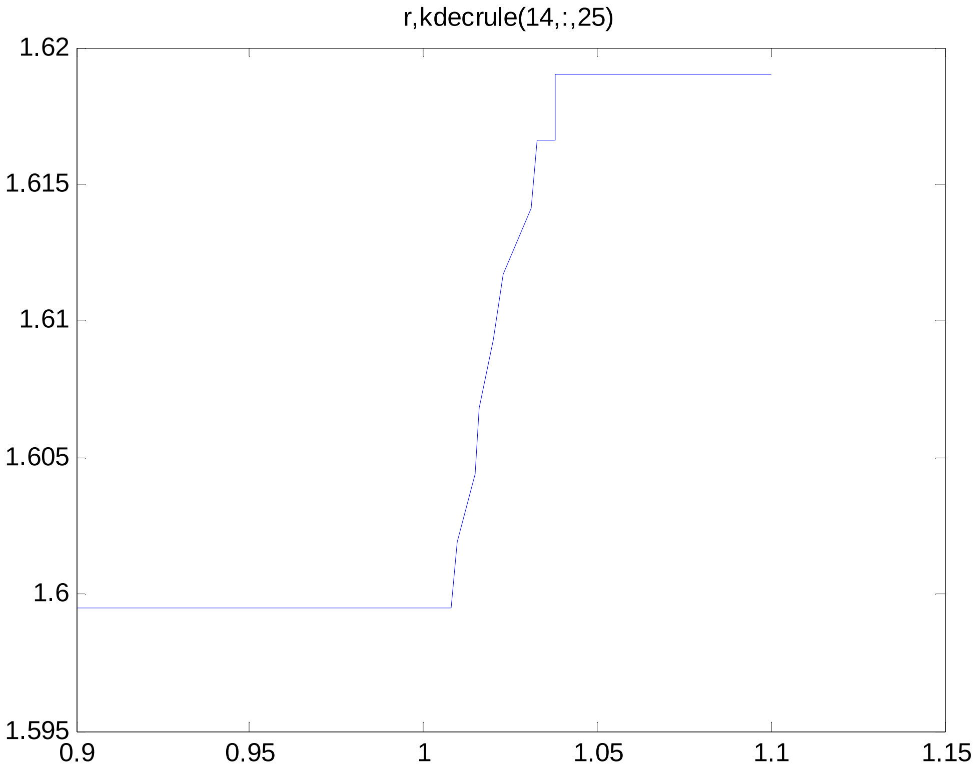
r,kdecrule(14,:,21)
1.62
1.615
1.61
1.605
1.6
1.595
1.59
1.585
1.58
1.575
0.9
0.95
1
1.05
1.1
1.15

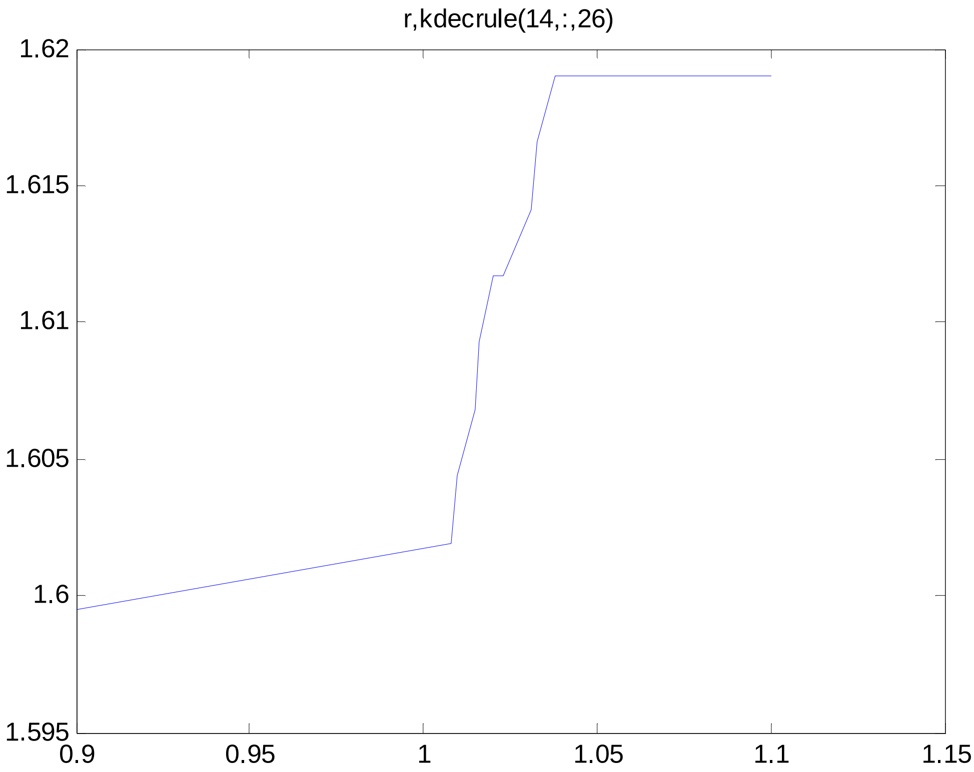


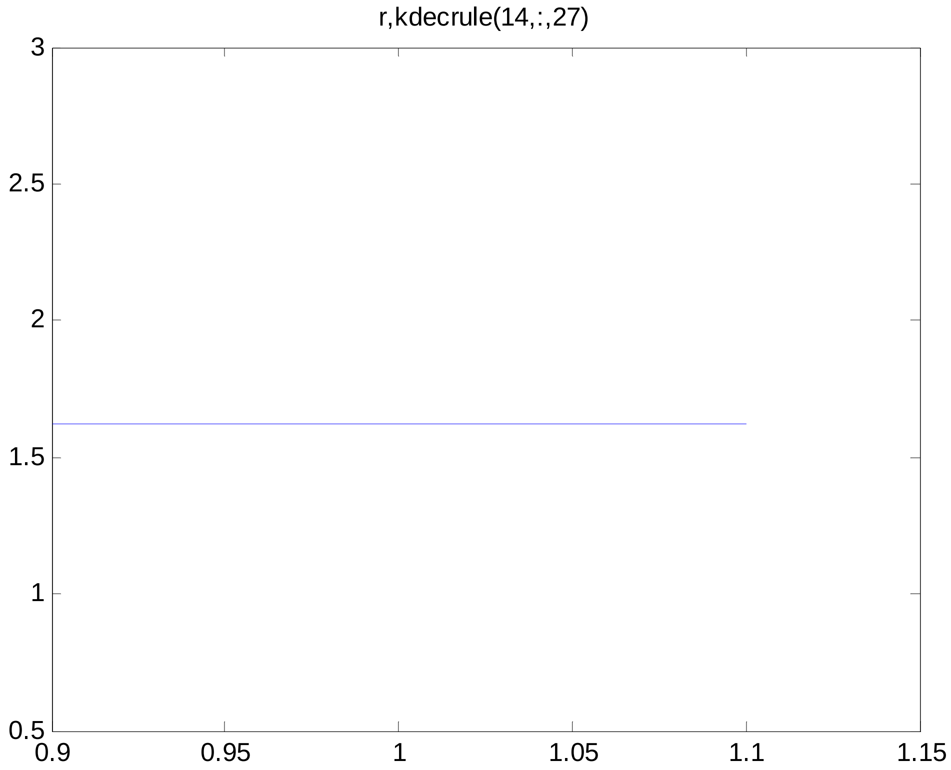
r,kdecrule(14,:,22)
1.625
1.62
1.615
1.61
1.605
1.6
1.595
1.59
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(14,:,23)
1.62
1.615
1.61
1.605
1.6
1.595
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(14,:,24)
1.62
1.615
1.61
1.605
1.6
1.595
0.9
0.95
1
1.05
1.1
1.15

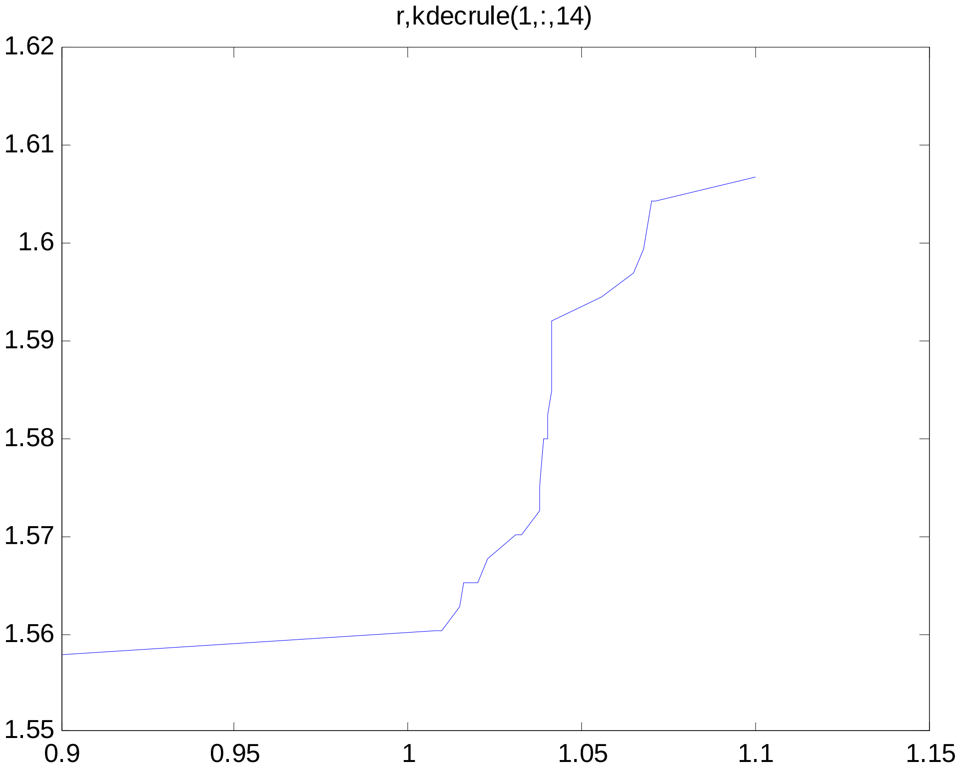

r,kdecrule(14,:,25)
1.62
1.615
1.61
1.605
1.6
1.595
0.9
0.95
1
1.05
1.1
1.15

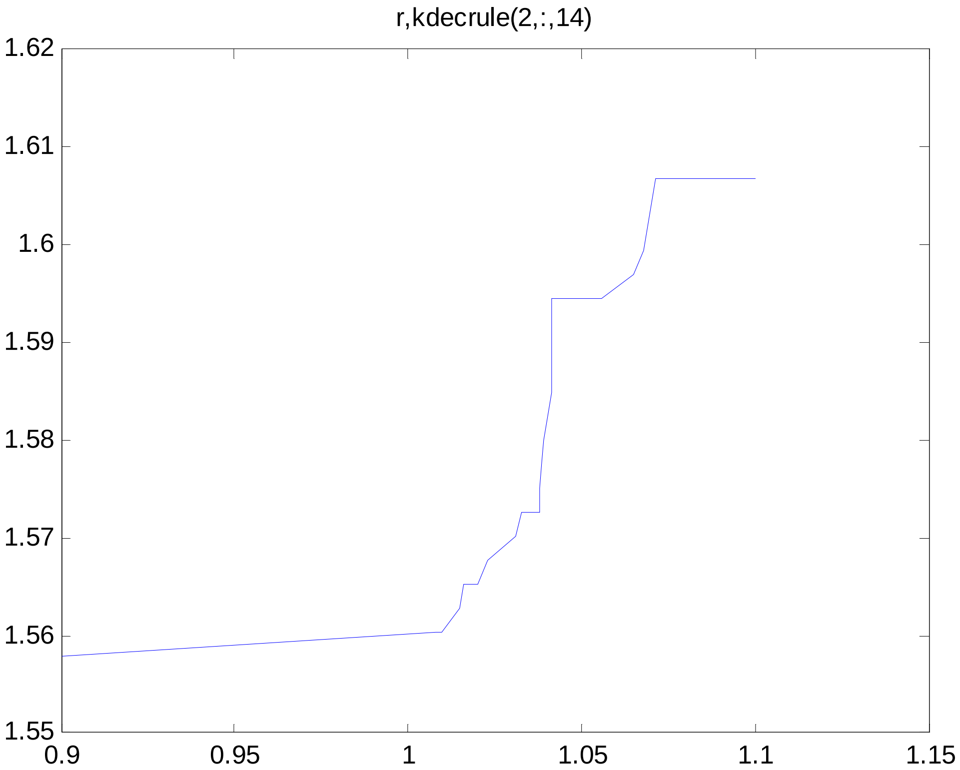

r,kdecrule(14,:,26)
1.62
1.615
1.61
1.605
1.6
1.595
0.9
0.95
1
1.05
1.1
1.15

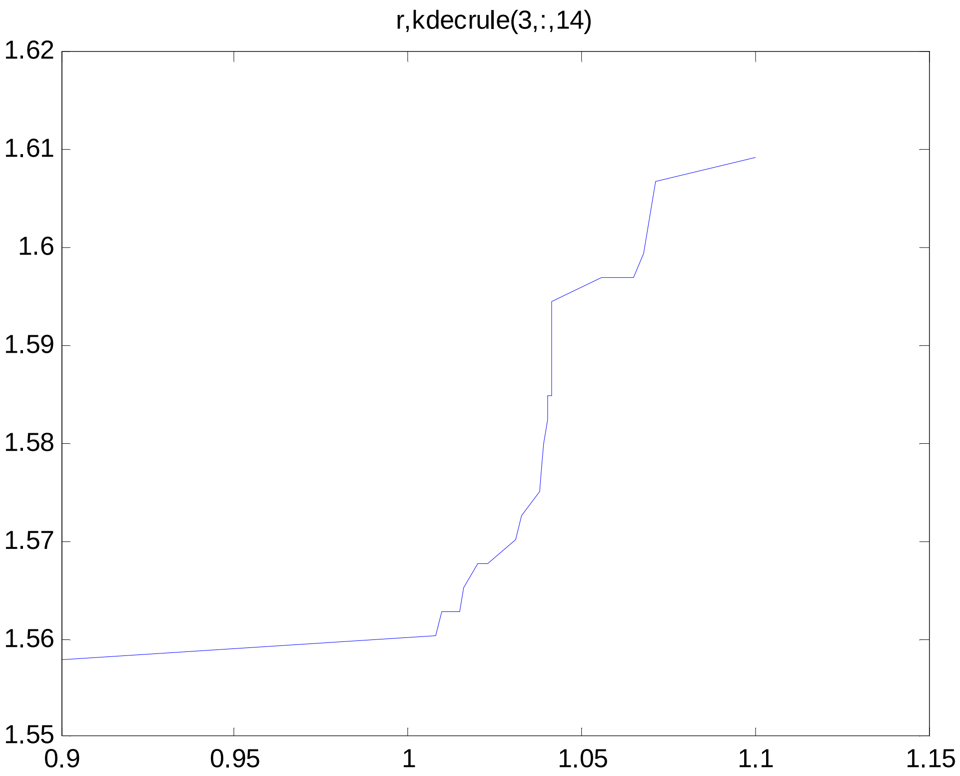


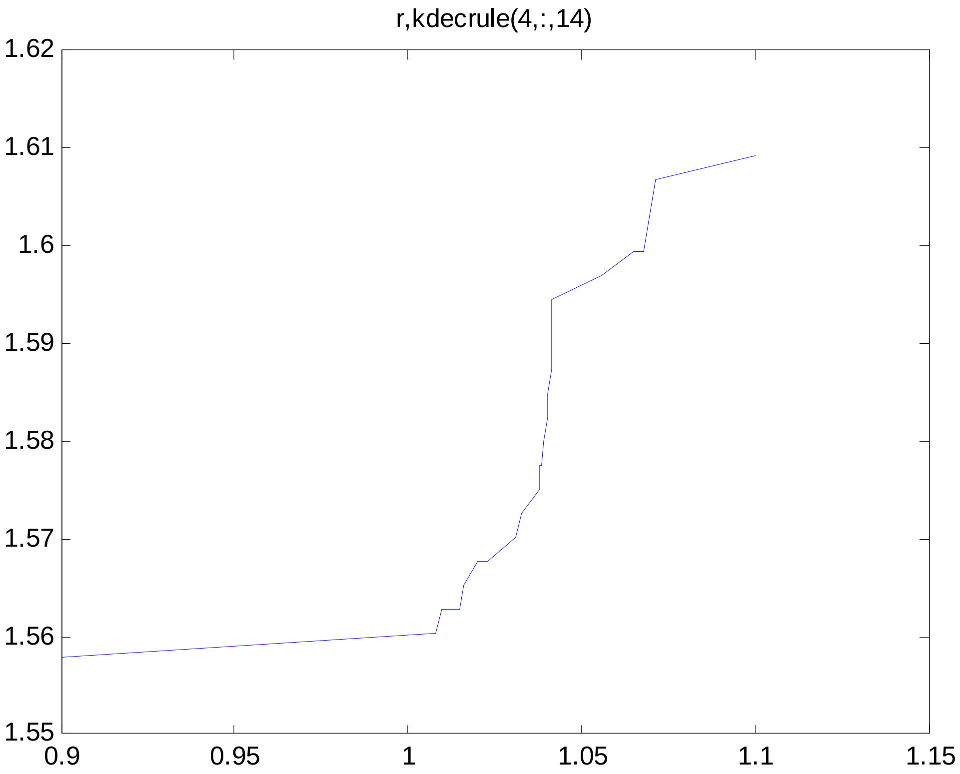
r,kdecrule(14,:,27)
3
2.5
2
1.5
1
0.5
0.9
0.95
1
1.05
1.1
1.15

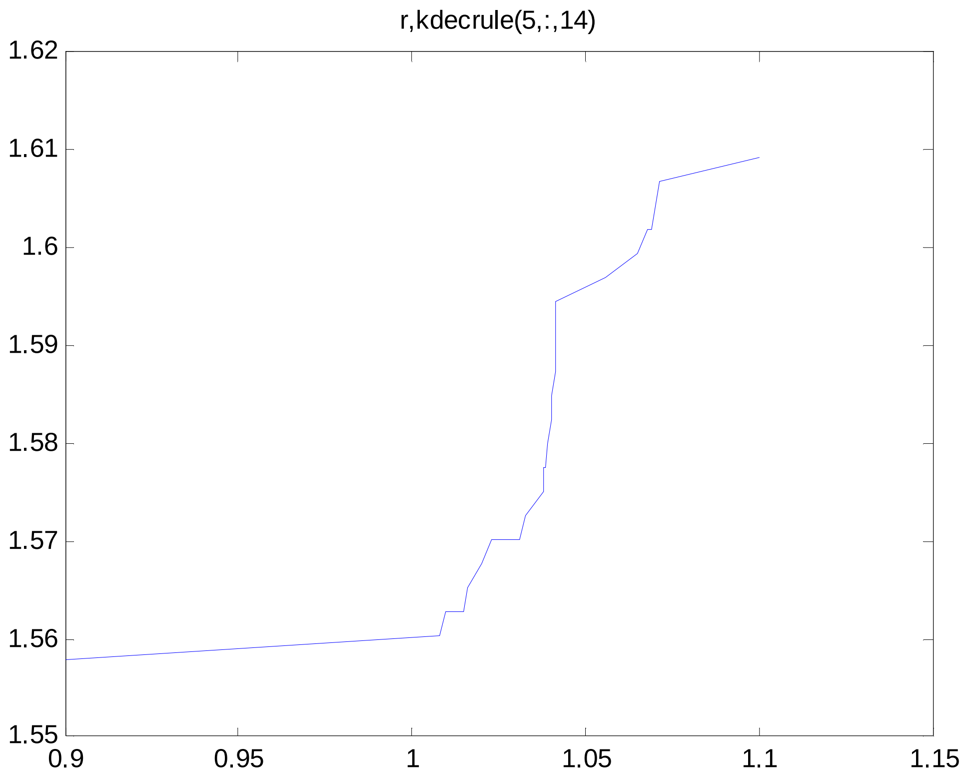
Case_12

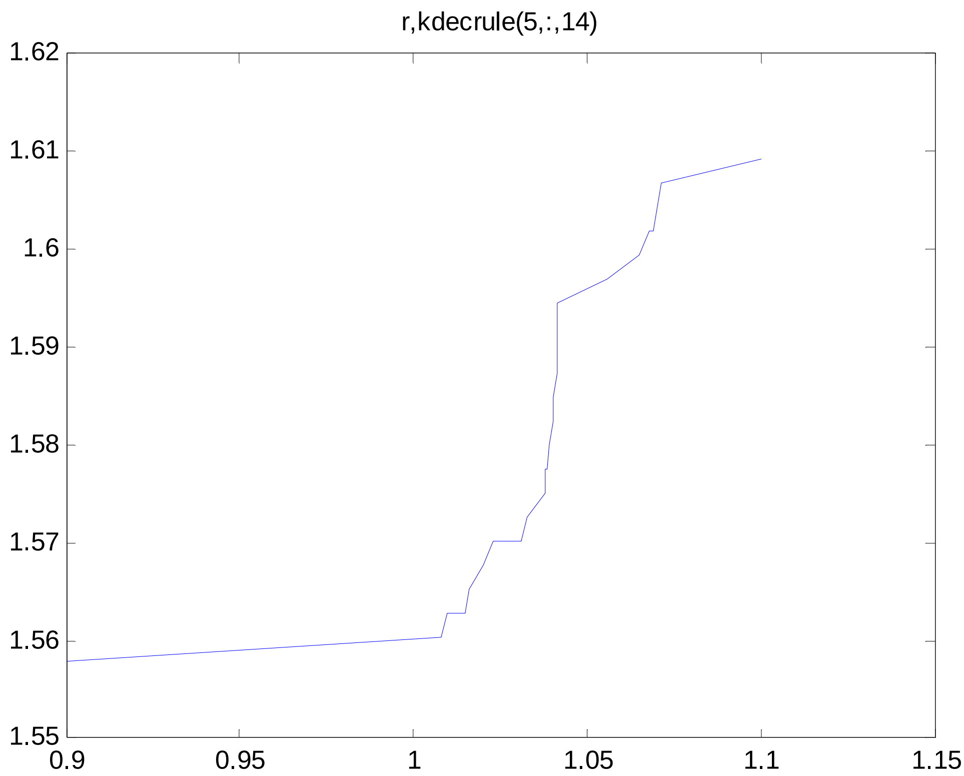

r,kdecrule(1,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15

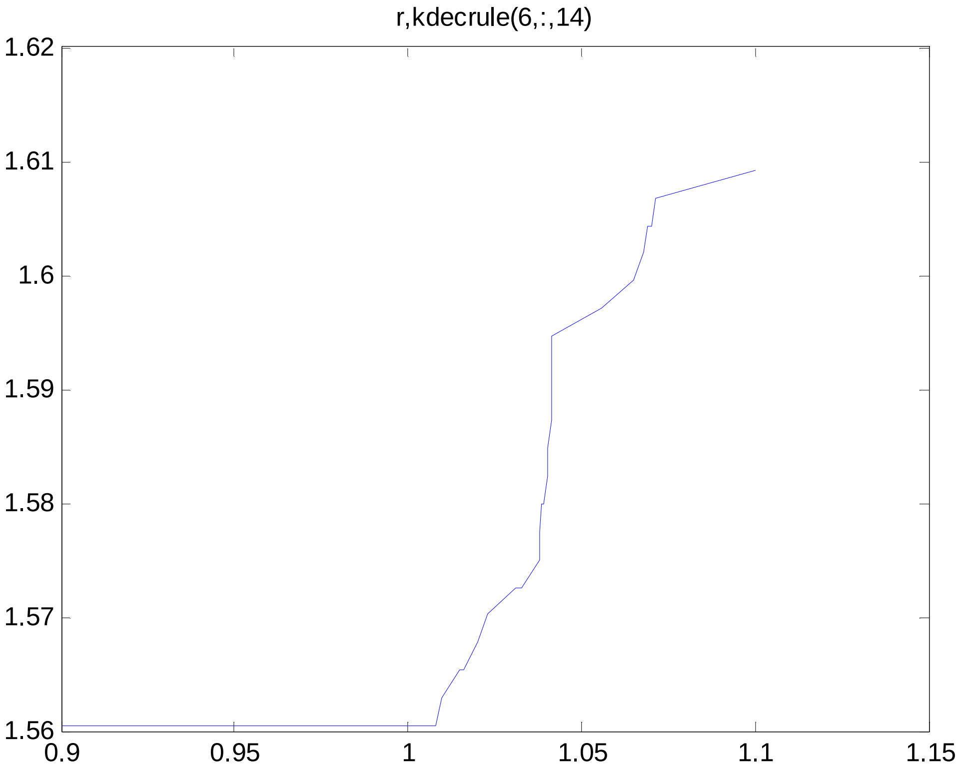

r,kdecrule(2,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(3,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15

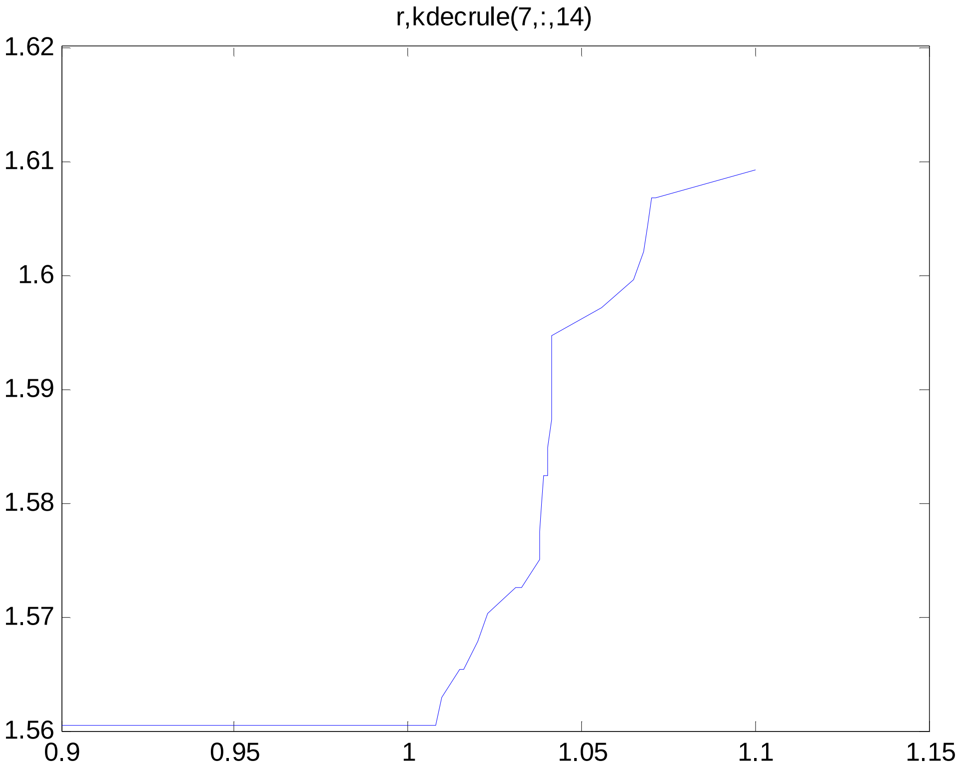

r,kdecrule(4,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(5,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15

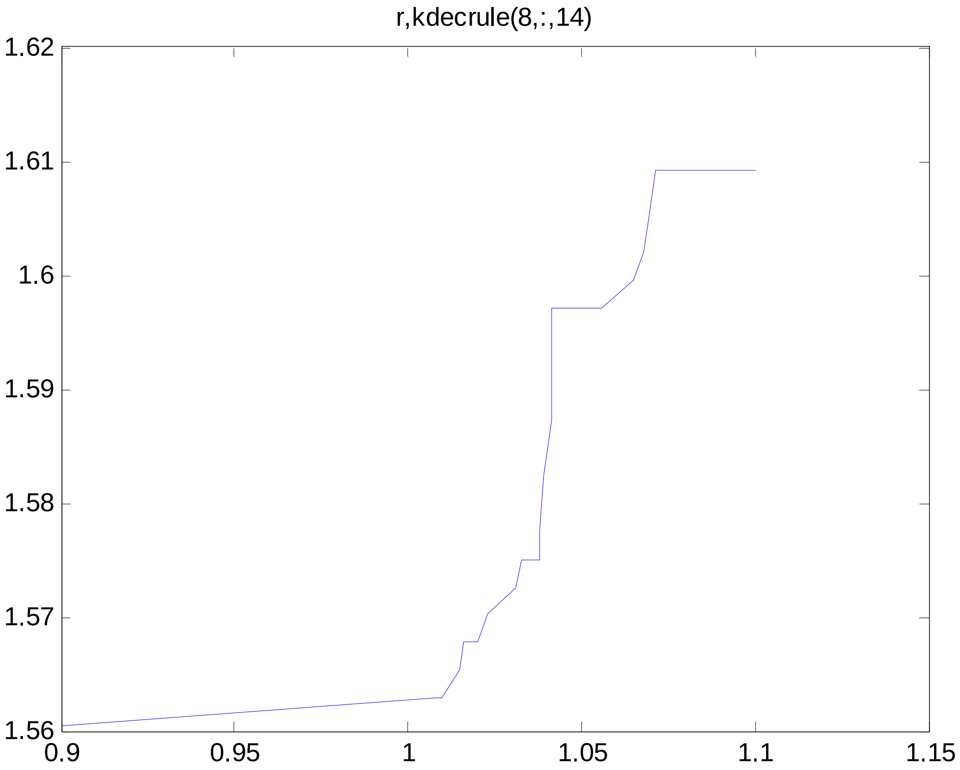

r,kdecrule(5,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
1.55
0.9
0.95
1
1.05
1.1
1.15

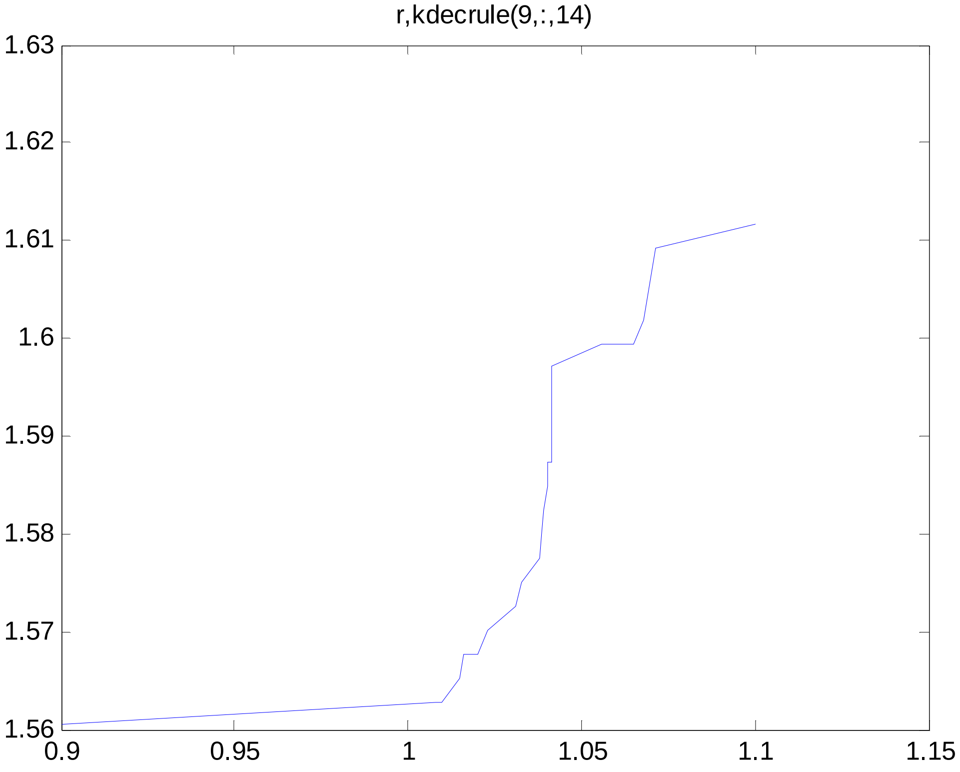


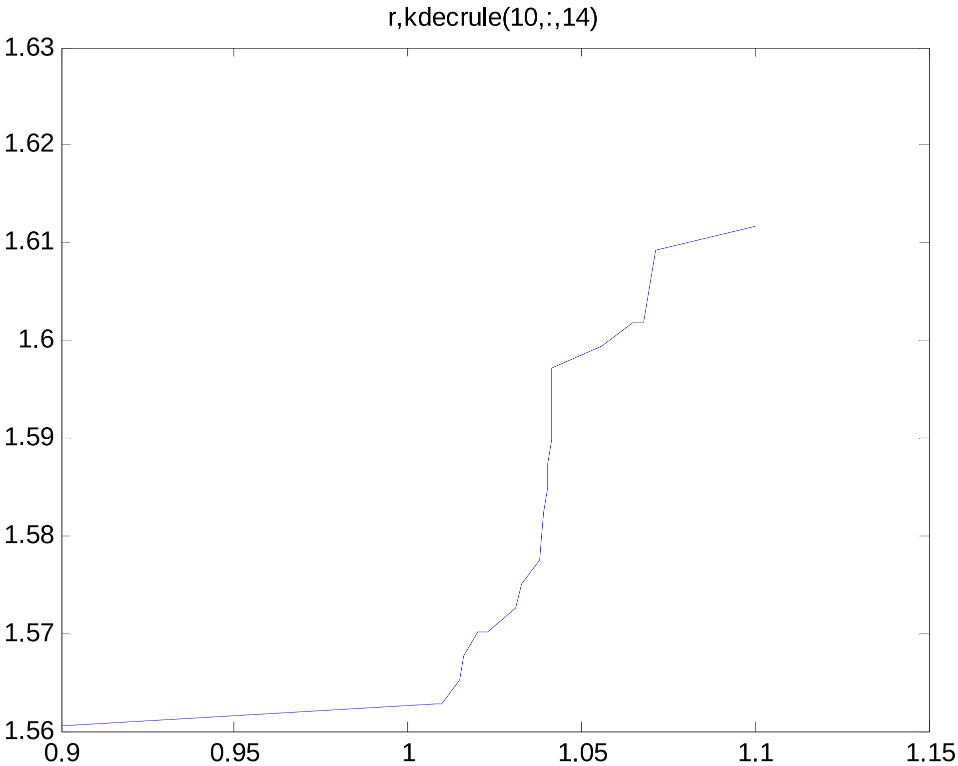
r,kdecrule(6,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

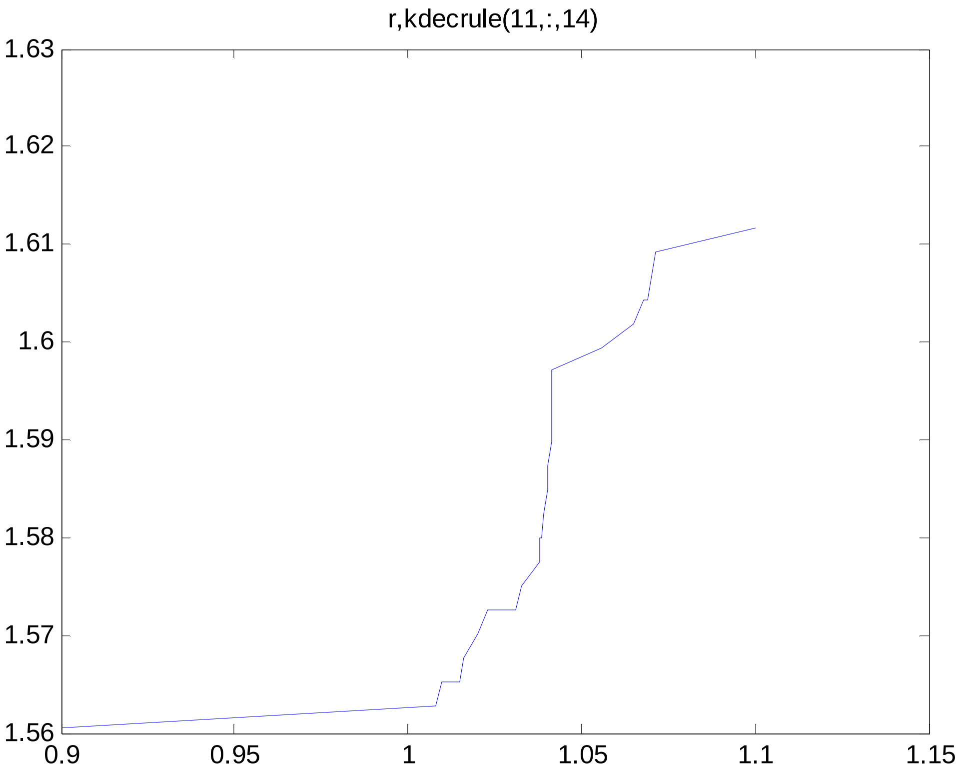


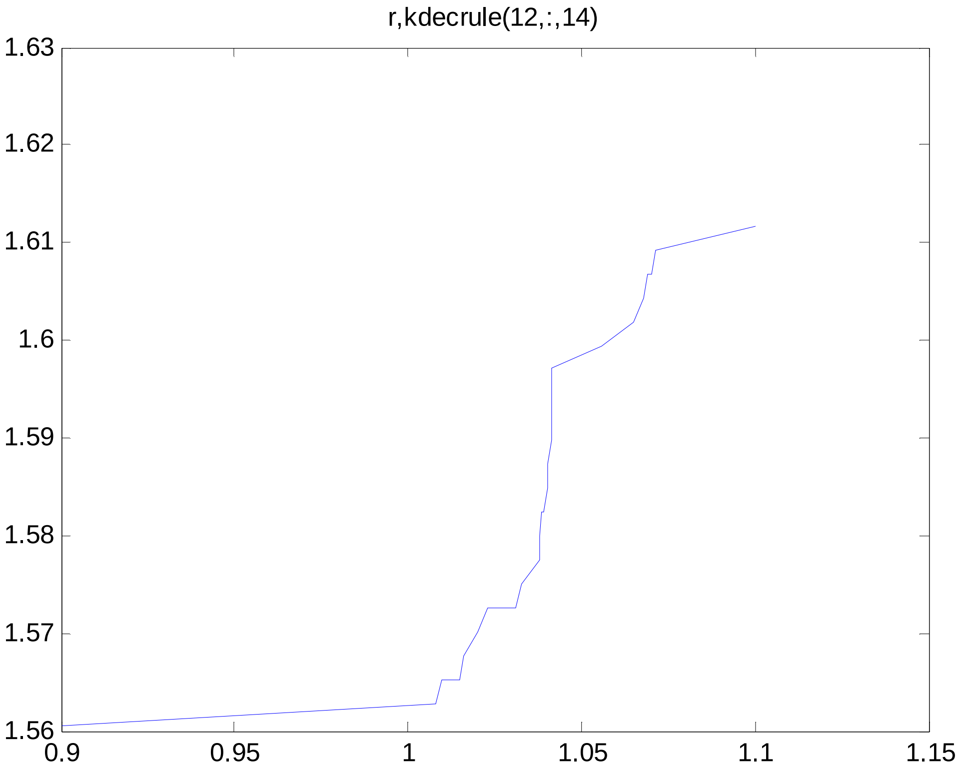
r,kdecrule(7,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

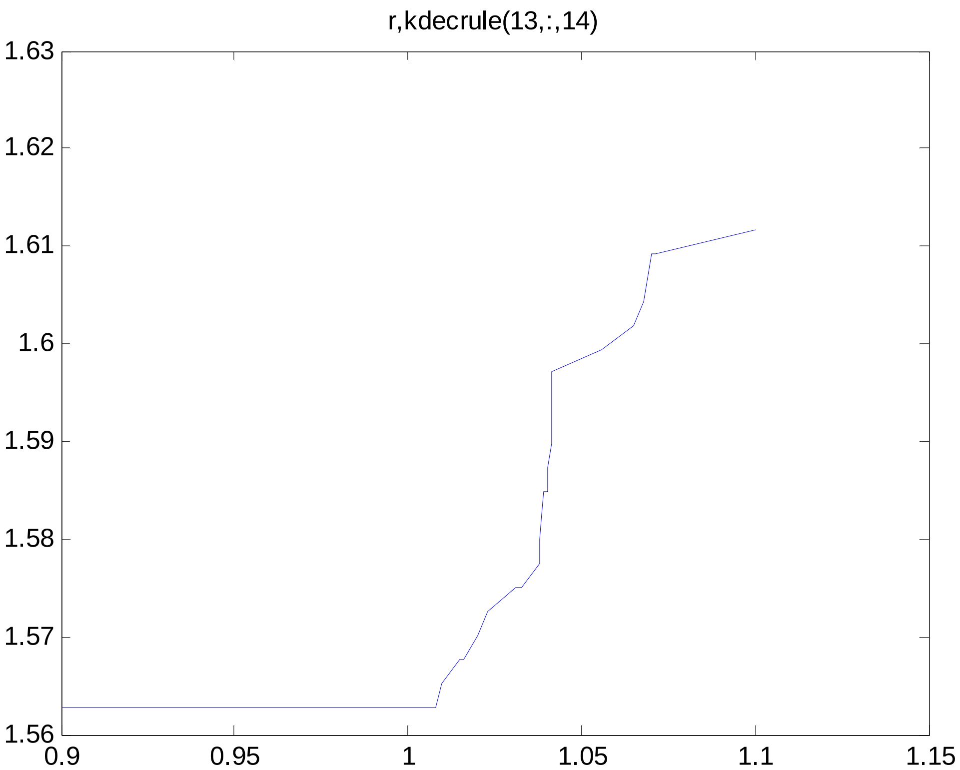

r,kdecrule(8,:,14)
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

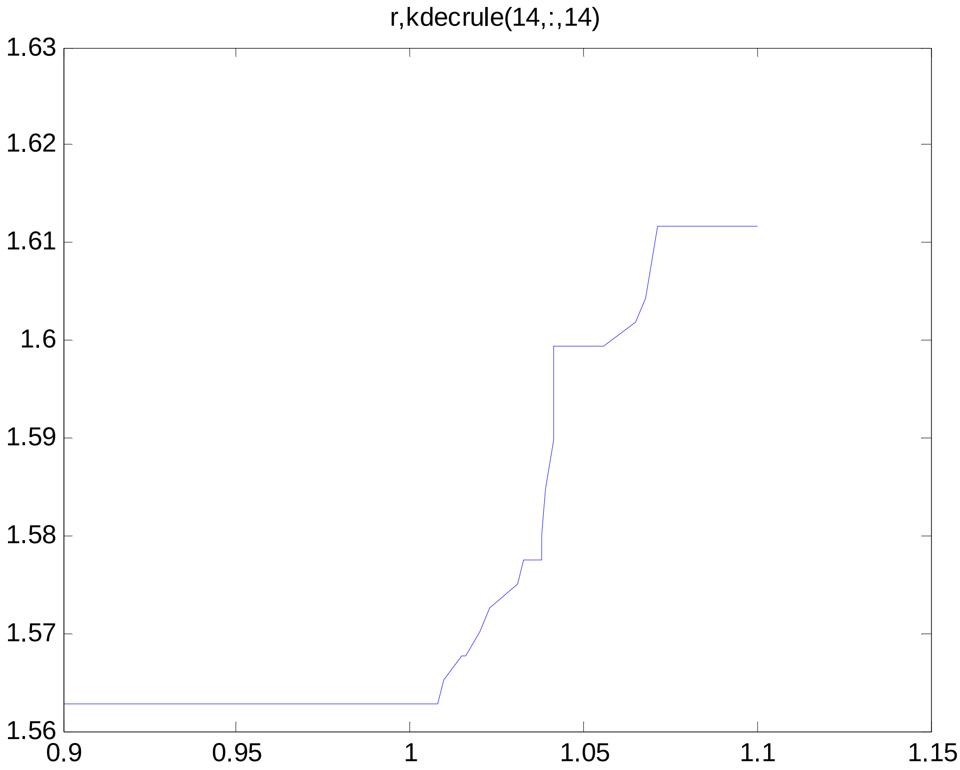

r,kdecrule(9,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

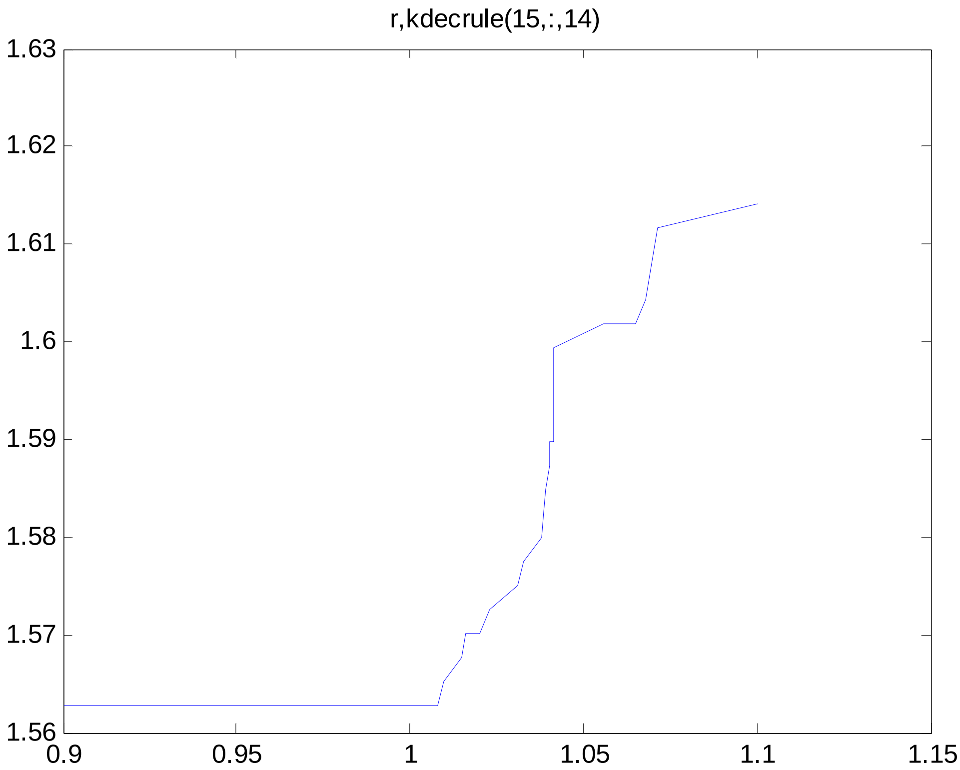

r,kdecrule(10,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

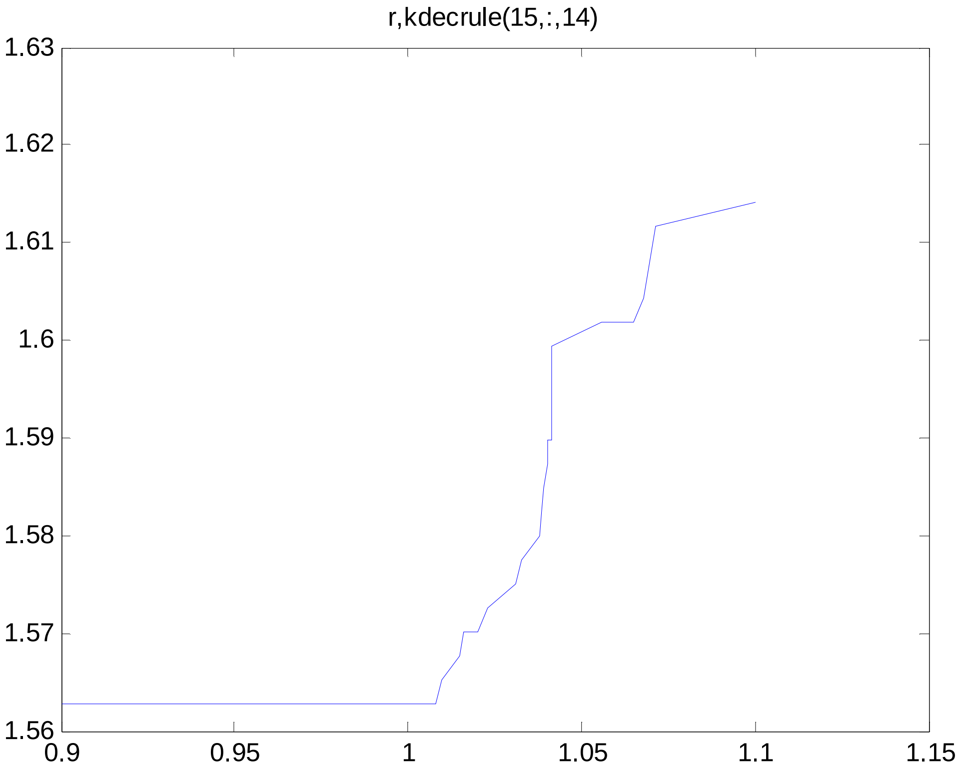

r,kdecrule(11,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

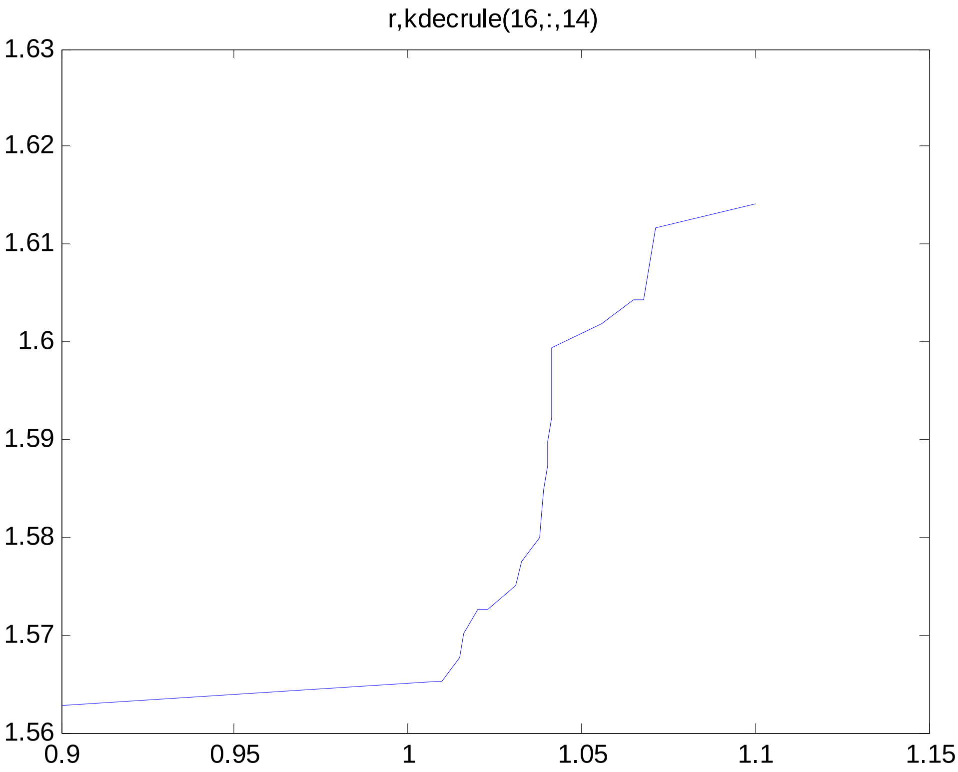

r,kdecrule(12,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

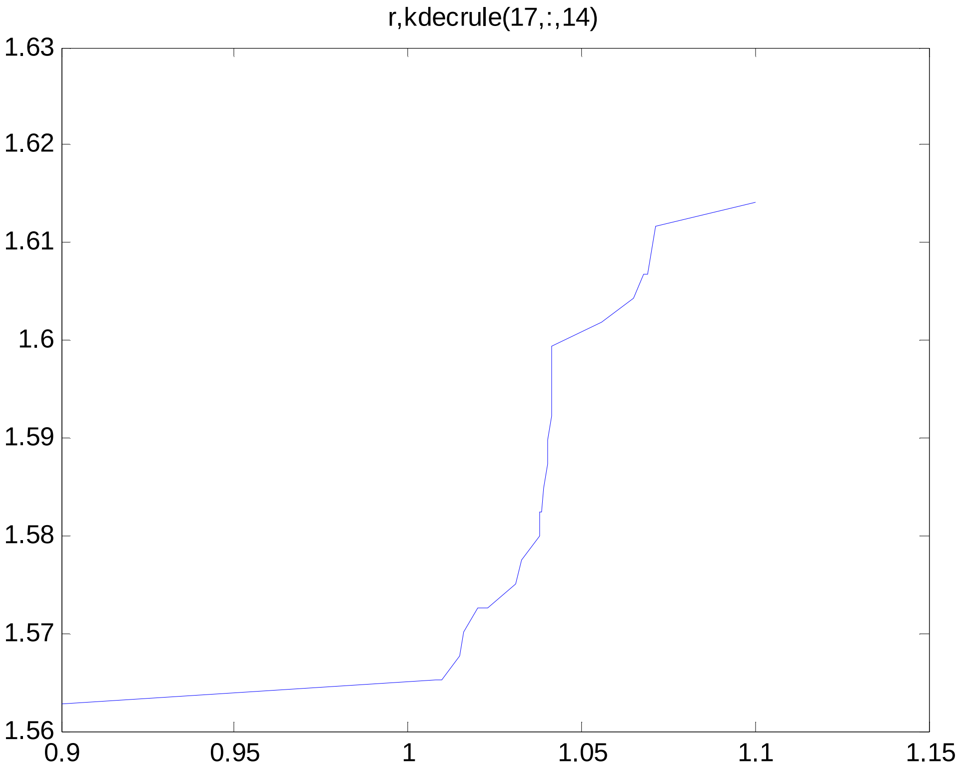

r,kdecrule(13,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

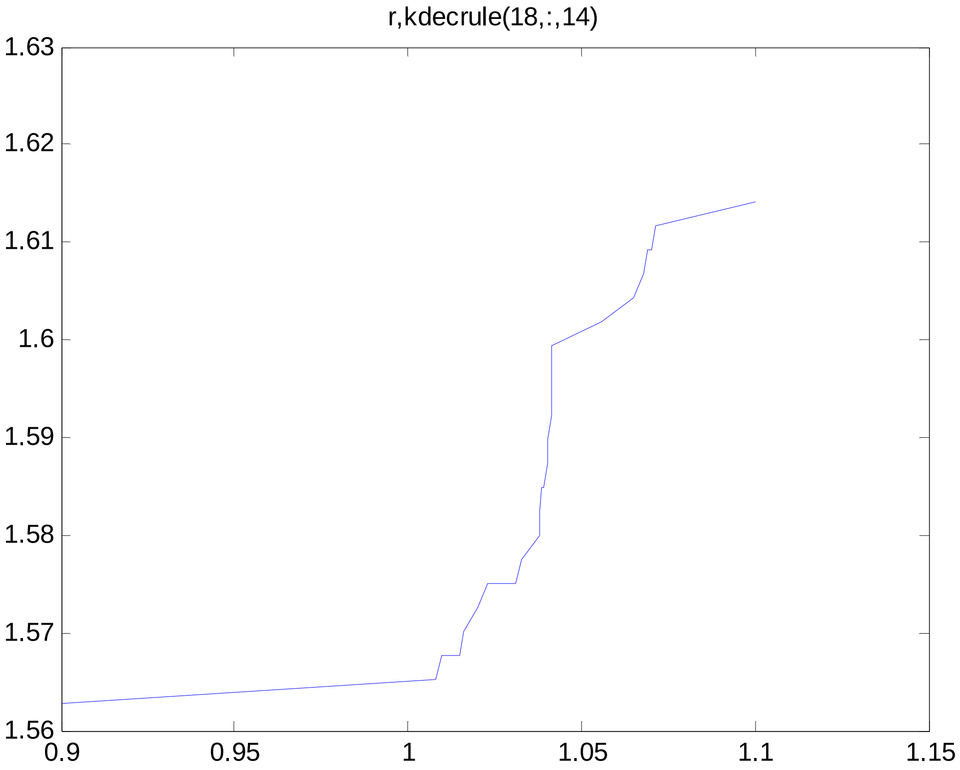

r,kdecrule(14,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

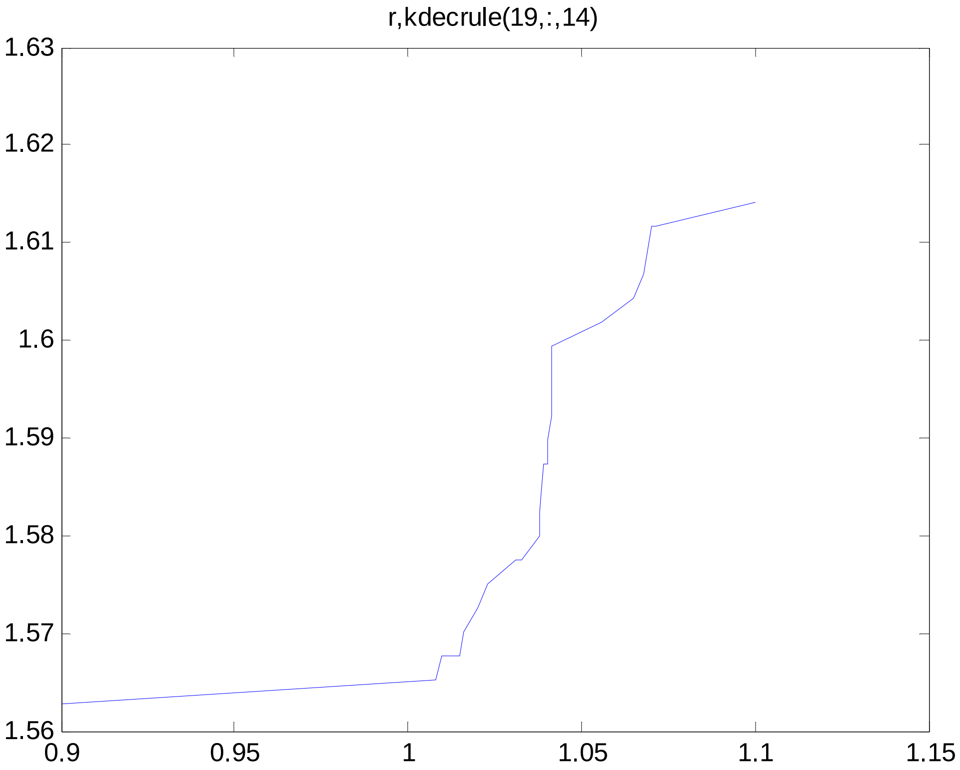

r,kdecrule(15,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

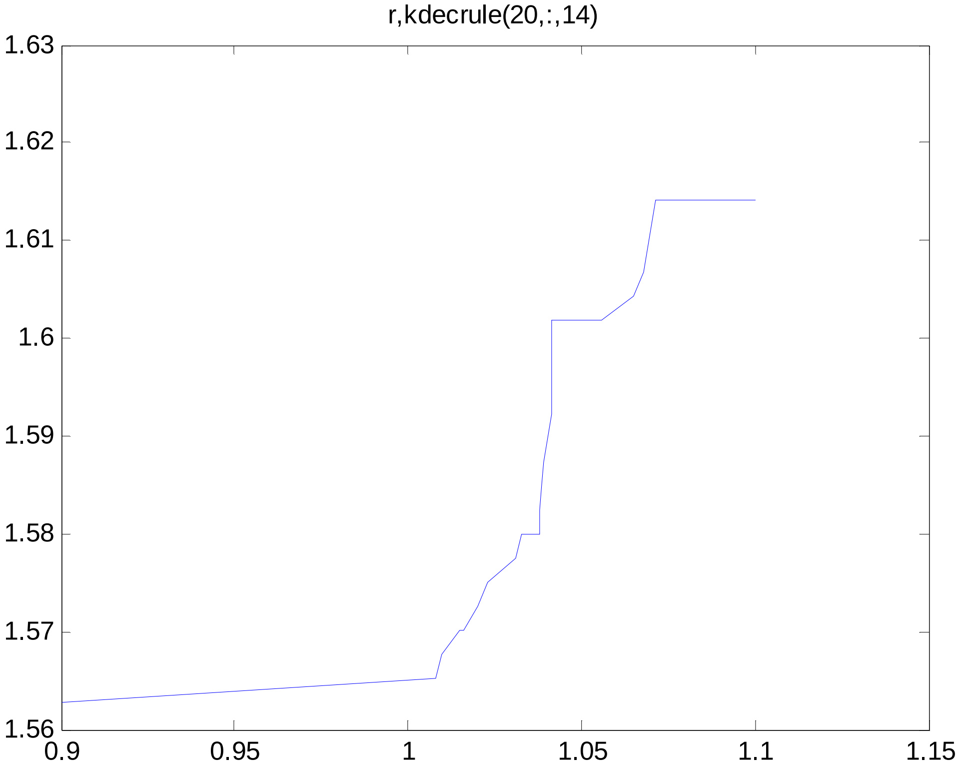

r,kdecrule(15,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

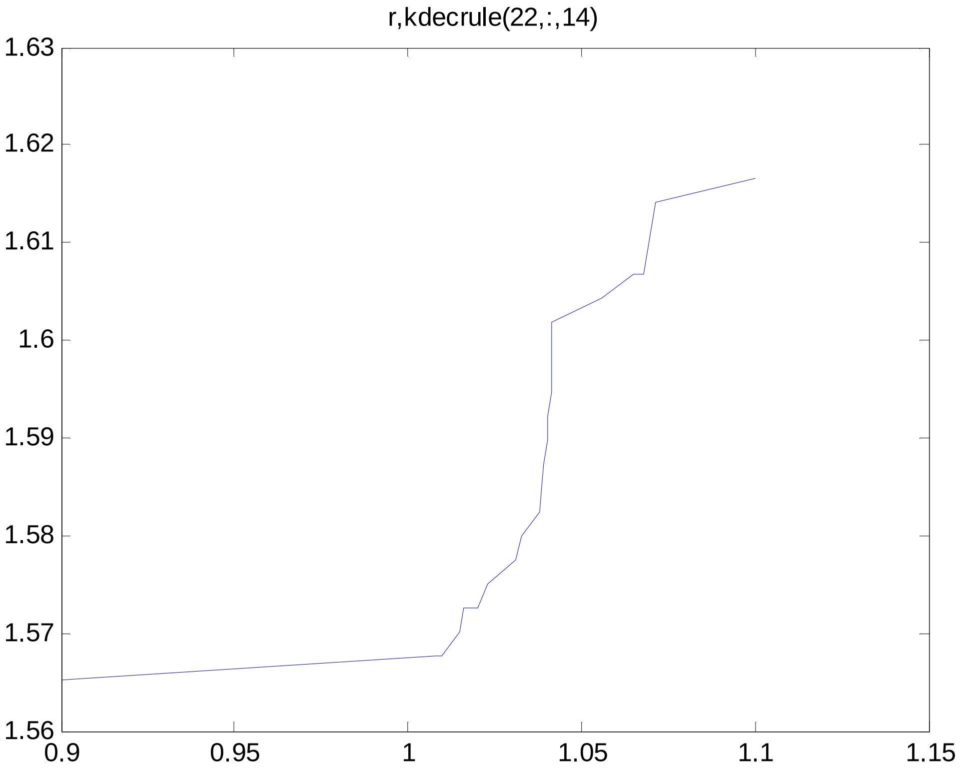

r,kdecrule(16,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

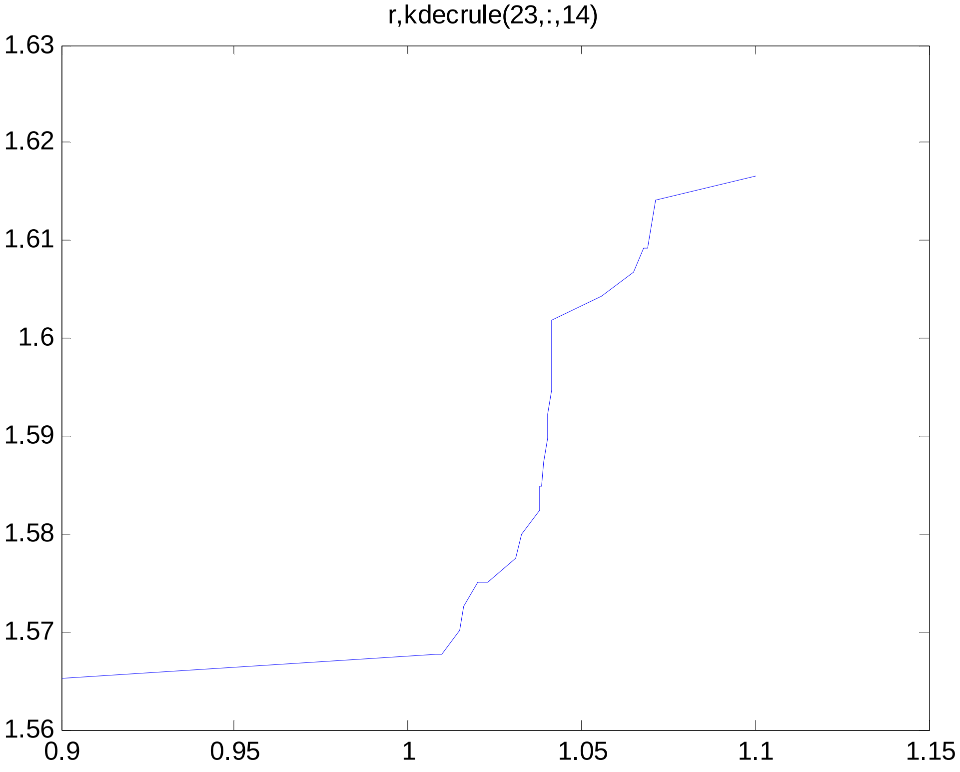

r,kdecrule(17,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

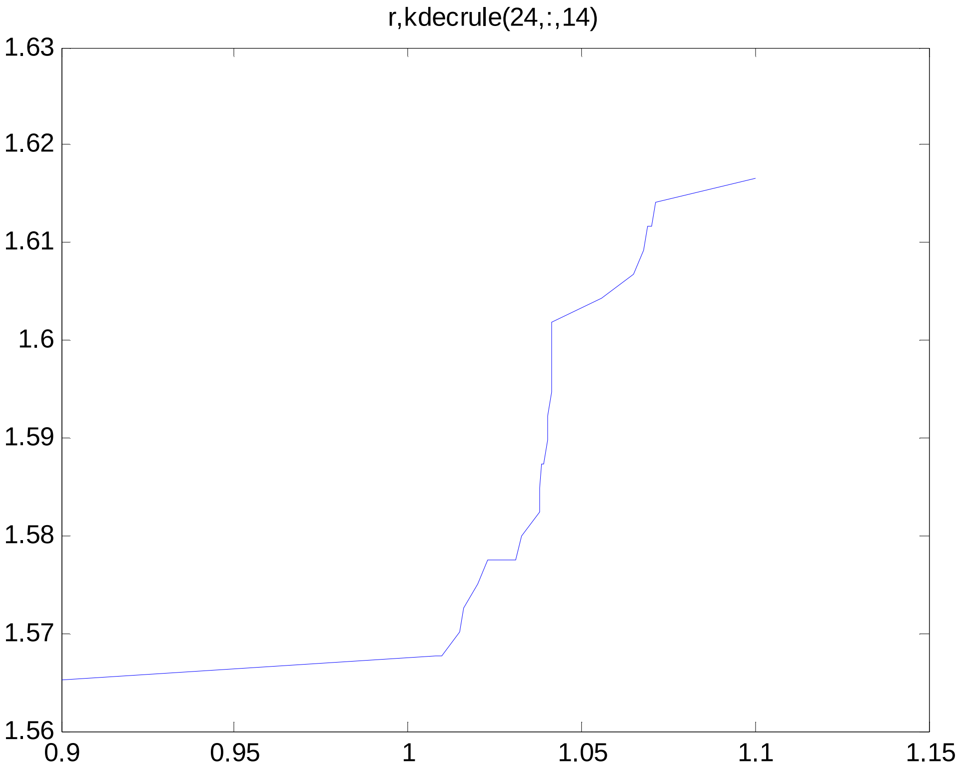

r,kdecrule(18,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(19,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

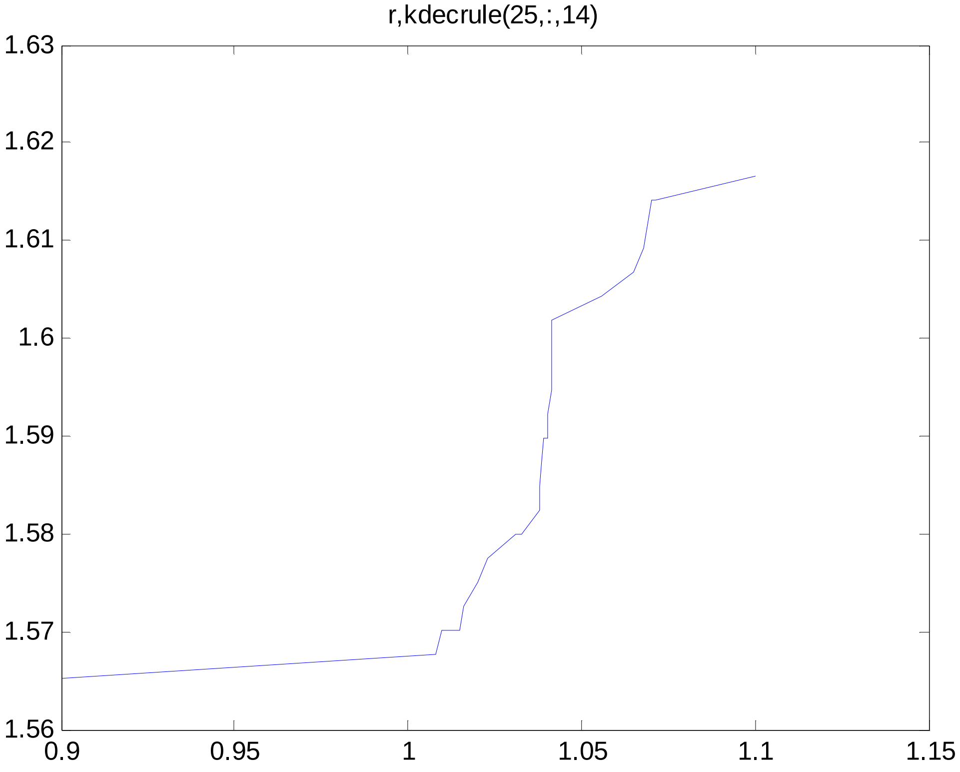

r,kdecrule(20,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(22,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

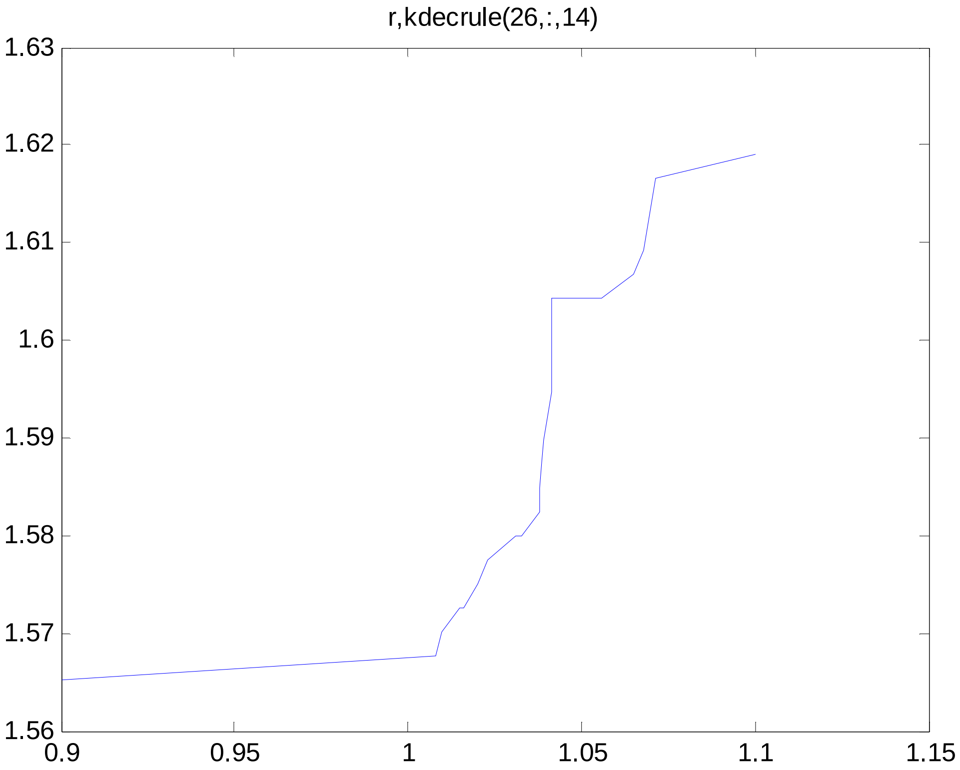

r,kdecrule(23,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15

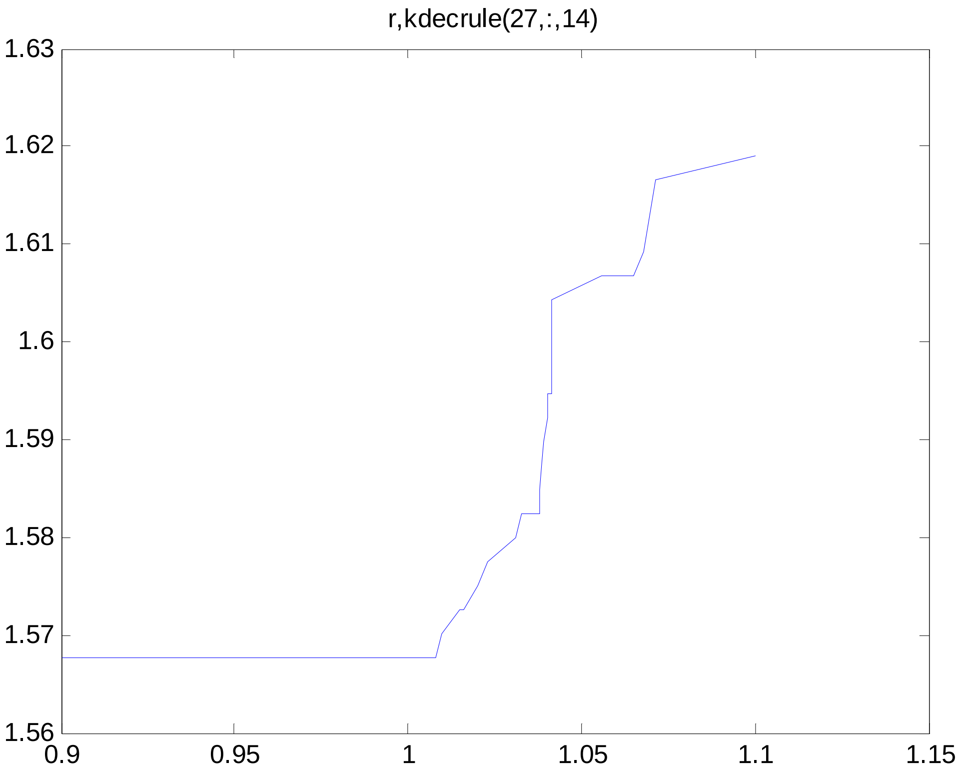


r,kdecrule(24,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15



r,kdecrule(25,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(26,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15


r,kdecrule(27,:,14)
1.63
1.62
1.61
1.6
1.59
1.58
1.57
1.56
0.9
0.95
1
1.05
1.1
1.15